TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

PREPARED CHIEFLY FROM MATERIAL AT
THE ARNOLD ARBORETUM OF
HARVARD UNIVERSITY

AND EDITED BY

CHARLES SPRAGUE SARGENT

Director of the Arnold Arboretum; Author of
The Silva of North America

PART I

JUGLANS MEXICANA
CRATÆGUS DUROBRIVENSIS
CRATÆGUS LANEYI
CRATÆGUS COLEÆ
CRATÆGUS MALOIDES
CRATÆGUS LUCULENTA
CRATÆGUS FRUTICOSA
CRATÆGUS PALUDOSA
EUPATORIUM LOESENERII
SENECIO ROBINSONIANUS
STYRAX RAMIREZII
FAXONANTHUS PRINGLEI
EHRETIA VISCOSA
BERBERIS SIEBOLDI
ILEX SERRATA
ACER CAPILLIPES
ACER TSCHONOSKII
MALUS HALLIANA
VIBURNUM WRIGHTII
LONICERA SACCATA
LONICERA KŒHNEANA
LONICERA FERRUGINEA
LONICERA ARIZONICA
LONICERA GRIFFITHII
ENKIANTHUS SUBSESSILIS

Issued November 26, 1902

BOSTON AND NEW YORK
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1902

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TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

THIS work consists of a series of plates, accompanied by brief descriptions, of new or little known trees and shrubs. It is edited by Professor C. S. Sargent, the author of *The Silva of North America* and the Director of the Arnold Arboretum of Harvard University, with the assistance of a number of specialists; and the plates are reproductions of original drawings made by Mr. C. E. Faxon, the most skillful and experienced botanical draftsman in America, whose work is familiar to the readers of Professor Sargent's *Silva* and of *Garden and Forest*. The material which serves as a basis for the work has been derived largely from the living collections and herbarium of the Arnold Arboretum. It will not be confined wholly to North American plants, but will include also the woody plants of other regions, especially those of the northern hemisphere which may be expected to flourish in the gardens of the United States and Europe, and those of special commercial or economic interest and value. This publication does not duplicate in any way *The Silva of North America*, but is supplementary to that publication, as from time to time it will contain descriptions and figures of trees newly discovered in North America.

The work will be published in parts at irregular intervals. Each part will contain twenty-five plates, and a volume will consist of four parts, of which it is hoped that at least two will appear each year, beginning in the fall of 1902. The parts will be sold separately, at $5.00 *net*, postage extra. A title-page and an index for each volume will be furnished with the fourth part.

A prospectus containing specimen pages of Part I, and two of the plates, will be submitted upon request. Address

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PART III., Plates LI.–LXXV., issued November 14, 1903.
PART IV., Plates LXXVI.–C., issued April 8, 1905.

INTRODUCTION

THIS work consists of a series of plates accompanied by brief descriptions of new or little known trees and shrubs of the northern hemisphere which may be expected to flourish in the gardens of the United States and Europe, and those of special economic value or scientific interest. The material which serves as a basis for the work has been derived largely from the living collections and from the herbarium of the Arnold Arboretum. In the preparation of this work I have had the assistance of a number of specialists who have signed the articles contributed by them. The plates are reproductions of original drawings made by Mr. C. E. Faxon. The first volume contains one hundred plates and the descriptions of two genera, forty-eight species, and a number of varieties new to science, and of a number of plants recently introduced into gardens.

C. S. SARGENT.

ARNOLD ARBORETUM,
February, 1905.

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TREES AND SHRUBS

TREES AND SHRUBS.

JUGLANS MEXICANA, S. WATS.

JUGLANS MEXICANA, S. Watson, *Proc. Am. Acad.* xxvi. 152 (1891).

Leaves eleven to fifteen-foliolate, from 3 to 4 decimetres long, with slender tomentose ultimately nearly glabrous rachises; leaflets ovate, acuminate, often slightly falcate, very unequal at the base, finely serrate, with minute incurved teeth tipped with dark glands, and slightly thickened and revolute on the margins, scabrate but ultimately nearly glabrous on the upper surface, coated below in early spring with pale tomentum, at maturity soft-pubescent below particularly along the midribs and in the axils of the veins, sessile or short-petiolulate, from 10 to 12.5 centimetres long and 4 centimetres wide, the terminal leaflet raised on a slender stalk often nearly 2.5 centimetres in length. Staminate flowers opening when the leaves are about a third grown, pedicellate in thick catkins from 7.5 to 12.5 centimetres in length; perianth six-lobed, the lobes rounded above, pubescent toward the base, its bract villose at the apex; stamens from eighteen to twenty-five in several ranks; anthers surmounted by short bifid connectives. Pistillate flowers often solitary, ovate, 4 millimetres long, their bracts and bractlets coated with hoary tomentum; stigmas clavate, spreading, bright red, 8 millimetres in length. Fruit oblong, short-pointed, covered with small orange-brown lenticels, puberulous especially toward the ends, from 4 to 6 centimetres long and from 2.5 to 5 centimetres broad; exocarp spongy, one third of an inch in thickness. Nut oblong to oblong-obovate, obtuse or slightly apiculate at the apex, bluntly ridged along the dorsal sutures, deeply sulcate, with longitudinal simple or forked grooves, reddish brown, the shell thick, lacunose, with large cavities. Lobes of the seed prominently keeled on the back, slightly concave and keeled on the inner face.

A tree, often 20 metres in height, with a trunk from 1 to 1.5 metres in diameter covered with thick deeply furrowed nearly black bark, stout wide-spreading branches forming an open rather irregular head, and comparatively slender branchlets coated, when they first appear, with short close pale tomentum, becoming pubescent during their second season and puberulous during their third year.

Mountain valleys, Monterey, Mexico, at elevations of 800 metres above the sea, *C. S. Sargent*, March, 1887; hills at San José Pass, San Luis Potosí, *C. G. Pringle* (No. 3322), October, 1890; near Monterey, *Canby, Trelease, and Sargent*, March 19, 1900, in flower.

This handsome and interesting tree, which is very common in cañons of the mountains near Monterey, has the habit, bark, and the foliage of *Juglans nigra*, Linnæus; the pubescence which clothes the leaves and young branchlets, however, resembles that of *Juglans cinerea*, Linnæus. The sulcate nut shows its relationship with the Texas *Juglans rupestris*, Engelmann, although much larger than the nuts of that species, which are destitute of the thick ridges on the dorsal sutures. The bifid connective of the anthers resembles that of *Juglans Californica*, Watson. From the little known *Juglans mollis*, Hemsley, it differs in the form and texture of the leaflets and in their venation and pubescent covering.

C. S. S.

EXPLANATION OF THE PLATE.

Plate I. Juglans Mexicana.

1. A flowering branch, natural size.
2. A staminate flower, enlarged.
3. An anther, enlarged.
4. A fruiting branch, natural size.
5. A fruit, part of the husk removed, natural size.
6. Cross section of a nut, natural size.

C. E. Faxon del.

JUGLANS MEXICANA, S. Wats.

CRATÆGUS DUROBRIVENSIS, SARG.

CRATÆGUS DUROBRIVENSIS, *n. sp.*

Leaves ovate, acute, slightly divided above the middle into two or three pairs of pointed lobes, sharply serrate except at the base, with slender spreading or incurved teeth tipped with minute red glands, membranaceous, at first hirsute, with a few scattered white hairs on the upper side of the slender midribs, soon entirely glabrous, dark yellow-green on the upper surface, paler on the lower surface, the primary veins slender and slightly impressed above, from 5 to 6.5 centimetres long and from 3 to 4 centimetres wide; petioles slender, deeply grooved, glandular, from 1.3 to 1.9 centimetres in length, dark red below the middle; leaves on vigorous leading shoots often ovate, rounded at the broad base, more deeply divided into broader lobes, more or less decurrent on the stouter petioles, and from 6.5 to 7.5 centimetres long and often 6.5 centimetres wide. Flowers from 2 to 2.5 centimetres in diameter, in many-flowered compact glabrous compound corymbs; bracts and bractlets linear, conspicuously glandular, caducous; calyx-cavity broad and shallow, the lobes lanceolate, glandular-serrate, villose on the upper surface, with scattered pale hairs, reflexed after anthesis; stamens twenty; filaments slender, elongated; anthers rose color; styles five, surrounded at the base by broad tufts of thick white tomentum. Fruit globose, about 1.6 centimetres in diameter, slightly depressed at the insertion of the slender peduncle, dark crimson, lustrous, marked by few small pale dots; calyx prominent, persistent, with a deep broad cavity, and closely appressed linear-lanceolate lobes abruptly narrowed from broad bases, bright red on their upper surface, irregularly glandular serrate above the middle; flesh thick, pale yellow, sweet, dry, and mealy; nutlets five, rounded and obscurely grooved or slightly ridged on the back, dark-colored, 6 millimetres long.

A broad shrub, from 3 to 6 metres in height, with numerous stout intricately branched stems covered with close smooth bark ashy gray near the ground and olive-green above, and slender branchlets dark green and glabrous when they first appear, soon becoming dark chestnut-brown and lustrous, dull ashy gray in their second season, and furnished with stout straight or slightly curved dark chestnut-brown spines from 3.8 to 5 centimetres in length and on the large stems often compound and from 7.5 to 10 centimetres long. Flowers at the end of May when the leaves are about half-grown. Fruit ripens in October and remains on the branches without loss of color until the new year and long after the leaves have fallen.

Steep rocky banks of the Genesee River, Rochester, New York, *John Dunbar*, May, 1900; banks of the Niagara River, New York, *C. S. Sargent*, September, 1901; Buffalo, New York, *John Dunbar*, September, 1901.

Cratægus Durobrivensis belongs to a small section of the genus of which *Cratægus dilatata*, Sargent, may be considered the type, and which may be distinguished by large flowers with twenty stamens and red anthers, and by large brightly colored fruit crowned with the much enlarged and conspicuous calyx, which is usually bright red on the upper surface of the base of the lobes. *Cratægus Durobrivensis* differs from the other known members of this group in the absence of pubescence and in the persistence of the fruit, which does not fall until midwinter. This peculiarity and the large showy flowers make it one of the most ornamental of the Thorns of the northern United States.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE II. CRATÆGUS DUROBRIVENSIS.

1. Part of a flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. Vertical section of a fruit, enlarged.
7. A nutlet, side view, enlarged.
8. A nutlet, rear view, enlarged.

C. E. Faxon del.

CRATÆGUS DUROBRIVENSIS, Sarg.

CRATÆGUS LANEYI.

CRATÆGUS LANEYI, *n. sp.*

Leaves oval to oblong-obovate, acute and often short-pointed at the apex, gradually narrowed from near the middle and cuneate and entire below, doubly serrate above, with slender glandular teeth, and usually divided into several short acute lateral lobes; when they unfold glabrous on the upper surface with the exception of a few short pale caducous hairs near the base of the midrib and slightly villose on the lower surface, at maturity membranaceous, dull yellow-green above, paler below, from 6 to 7 centimetres long and from 4 to 5 centimetres wide, with slender midribs and from three to five pairs of thin primary veins deeply impressed above and puberulous below; on vigorous leading shoots often 8 centimetres long and 6 centimetres wide; petioles stout, winged above and covered while young on the upper side with short white hairs, soon glabrous, from 1.3 to 1.5 centimetres long; stipules linear, caducous. Flowers cup-shaped, about 2.5 centimetres in diameter on elongated slender villose pedicels, in broad loose compound many-flowered villose corymbs; calyx-tube narrowly obconic, coated with long matted pale hairs, the lobes elongated, acuminate, coarsely glandular-serrate, villose on the outer surface near the base and on the inner surface, reflexed after anthesis; stamens twelve to fifteen; anthers large, creamy white; styles two to four, surrounded at the base by a narrow ring of pale tomentum. Fruit in many-fruited nearly glabrous erect clusters, subglobose or sometimes a little longer than broad, dark orange-red, lustrous, marked by occasional large pale dots; calyx much enlarged, with a prominent tube, a broad deep cavity and spreading reflexed lobes dark red on the upper side near the base; flesh thin and green; nutlets two to four, from 7 to 8 millimetres long, often 6 millimetres broad, full and rounded at the ends, prominently ridged on the back, with a broad rounded ridge, and penetrated on each of the inner faces by a deep cavity wide near the apex of the nut and gradually narrowed to the base.

A shrubby tree, from 2.5 to 3 metres in height, with a short trunk from 2.5 to 3 centimetres in diameter, slender branches, the lower wide-spreading, the upper spreading and ascending, forming an open handsome head, and stout nearly straight branchlets marked by small dark lenticels, orange-green and slightly villose at first, bright red-brown and lustrous during one or two seasons, and then dark reddish brown, and armed with numerous stout straight bright chestnut-brown spines from 5 to 6 centimetres long. Flowers during the first week of June. Fruit ripens the first of October.

Low moist and often inundated banks of the Genesee River in Genesee River Park, Rochester, New York, *C. C. Laney*, June, 1899; *John Dunbar*, June and October, 1901; *C. S. Sargent*, September, 1901.

Related to *Cratægus tomentosa*, Linnæus, *Cratægus Laneyi* differs from that species in its thicker leaves, which are puberulous and not tomentose even while young, in its cup-shaped flowers with fewer stamens and yellow not purple anthers, and in its larger subglobose not oblong fruit, which does not become succulent like the fruit of *Cratægus tomentosa*. It differs also from the Linnæan species in its bright red-brown not dull gray branchlets, which are more generally armed, and in the color of the spines. In its name this handsome species may help to commemorate Calvin Cooke Laney, the superintendent of the parks of the city of Rochester, and his zeal and industry in making known the remarkable collection of Cratægus which he and his assistants have found in the valley of the Genesee River.

C. S. S.

EXPLANATION OF THE PLATE.

Plate III. Cratægus Laneyi.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, natural size.
6. Vertical section of a fruit, natural size.
7. A nutlet, front view, enlarged.
8. A nutlet, rear view, enlarged.

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C. E. Faxon del.

CRATÆGUS LANEYI, Sarg.

CRATÆGUS COLEÆ, SARG.

CRATÆGUS COLEÆ, *n. sp.*

Leaves ovate to oval, acute, broadly cuneate at the entire base, irregularly and often doubly serrate above, with small incurved teeth tipped with minute dark glands, and divided into numerous short acute lateral lobes; glabrous as they unfold with the exception of a few scattered caducous pale hairs on the upper surface, at maturity membranaceous, dark green and lustrous above, pale and somewhat glaucous below, from 4.5 to 5 centimetres long and from 3 to 3.5 centimetres wide; petioles slender, nearly terete, from 1.2 to 1.5 centimetres long; stipules linear, coarsely glandular-serrate, caducous; leaves on vigorous shoots often full and rounded at the base and more coarsely serrate and more deeply lobed than the leaves of fertile branchlets. Flowers from 18 to 20 millimetres in diameter on elongated slender pedicels, in broad compound many-flowered corymbs; bracts and bractlets linear, conspicuously glandular-serrate, caducous; calyx-tube broadly obconic, the lobes gradually narrowed from broad bases, acuminate, glandular-serrate, with small bright red stipitate glands, villose on the inner surface particularly toward the base, reflexed after anthesis; stamens eighteen or twenty; anthers large, tinged with pink; styles two to five, usually two to four, surrounded at the base by a broad ring of pale tomentum. Fruit pendant on slender pedicels, in many-fruited clusters, subglobose, often somewhat broader than long, bright orange-red marked by small pale dots, from 8 to 10 millimetres in diameter; calyx enlarged and prominent, with a broad deep tube and elongated reflexed anther-lobes sometimes deciduous before the fruit falls; nutlets two to five, broad, obtuse at the ends, 7 to 8 millimetres long, prominently ridged on the back, with a high broad ridge, deeply penetrated on each of the inner faces by a long narrow longitudinal depression.

A broad tree-like shrub, with numerous stout spreading stems covered with close dark bark and from 4 to 5 metres tall, and slender nearly straight or slightly zigzag glabrous branchlets marked by oblong pale lenticels, light yellow-green when they first appear, bright red-brown and very lustrous during their first season and dark gray-brown the following year, and armed with numerous nearly straight stout lustrous spines often pointed toward the base of the branch and from 2.5 to 4.5 centimetres long. Flowers during the last week of May. Fruit ripens at the end of September.

Hillsides in rich moist soil near Grand Rapids, Michigan, *Miss E. J. Cole,* May and September, 1901.

Although it differs from *Cratægus tomentosa*, Linnæus, in the absence of pubescence and in the size and shape of the fruit, and from all the species related to *Cratægus macracantha*, Lindley, in its thin leaves with their slender veins, the longitudinal grooves on the inner face of the nutlets indicate the relationship of *Cratægus Coleæ* with the Tomentosa group, in which it may form the type of an interesting and distinct subsection.

It is a pleasure to associate with this handsome shrub the name of its discoverer, Miss Emma J. Cole of Grand Rapids, Michigan, the author of *The Grand Rapids Flora*, and a careful and industrious student of the plants of central Michigan, where she has made a number of other important discoveries. C. S. S.

EXPLANATION OF THE PLATE.

Plate IV. Cratægus Coleæ.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit, enlarged.
6. Cross section of a fruit, enlarged.
7. A nutlet, side view, enlarged.
8. A nutlet, rear view, enlarged.

C. E. Faxon del.

CRATÆGUS COLEÆ, Sarg.

CRATÆGUS MALOIDES, SARG.

CRATÆGUS MALOIDES, *n. sp.*

Leaves oblong-obovate to oval, gradually narrowed from near the middle and acute or full and rounded at the apex, cuneate and entire below, finely and usually doubly serrate above, with broad straight or incurved glandular teeth; when they unfold bronze-red and slightly hairy on the upper side of the midribs, and furnished on the under surface with large tufts of pale tomentum in the axils of the veins, at maturity coriaceous, glabrous, dark green and lustrous above, pale yellow-green below, from 3 to 3.5 centimetres long and from 1 to 1.5 centimetres wide, with slender midribs and few thin primary veins running obliquely toward the apex of the leaf and only slightly impressed above; petioles slender, more or less wing-margined above, glandular, villose at first but soon glabrous, often red, about 1 centimetre long; stipules linear, minute, caducous; leaves on vigorous shoots frequently broadly oval, slightly divided into short lateral lobes and from 3.5 to 4 centimetres long and broad, their stipules foliaceous, coarsely glandular-serrate. Flowers 2 centimetres in diameter on slender pedicels, in three-flowered glabrous corymbs subtended by one or two solitary flowers from the axils of the upper leaves; bracts and bractlets linear, minute, finely glandular-serrate, bright red; calyx-tube broadly obconic, glabrous, the lobes linear-lanceolate, elongated, bright red, reflexed after anthesis; stamens fifteen to twenty, anthers large, dark red; styles three to five. Fruit usually solitary or in two or three-fruited clusters on stout red pedicels from 1.2 to 2.5 centimetres long, short-oblong to obovate, truncate at the broad apex, gradually narrowed and full and rounded at the base, with a deep depression at the insertion of the stalk, bright cherry-red and very lustrous, from 1.5 to 1.7 centimetres long and about 1.2 centimetres wide; flesh thick, bright yellow, very juicy, subacid; calyx-cavity narrow and shallow, the lobes gradually narrowed from broad bases, entire, wide-spreading; nutlets three to five, comparatively small, rounded and obscurely ridged on the back, about 7 millimetres long.

A tall shrub, with numerous wide-spreading slender stems and thin slightly zigzag branchlets marked by small white oblong lenticels, dark red and covered with scattered pale hairs when they first appear, soon glabrous, dark mahogany-red and lustrous during their first summer, dull ashy gray during their second year, and armed with few straight chestnut-brown spines from 2 to 2.5 centimetres in length. Flowers during the first week of March. Fruit ripens early in June and falls gradually until the beginning of July.

Borders of wet clay prairies at Haw Creek, six miles east of Seville, Volusia County, Florida, *A. H. Curtiss* (No. 6679), July, 1900, March and June, 1901.

The large flowers in few-flowered corymbs with their numerous stamens and large dark red anthers and the large early ripening fruit of this very distinct species point to its relationship with *Cratægus æstivalis* of Torrey & Gray. The fruit, which is very beautiful and more juicy than that of any other Cratægus I have seen, is distinctly subacid and of a true apple flavor.

C. S. S.

EXPLANATION OF THE PLATE.

Plate V. Cratægus maloides.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit, natural size.
6. Cross section of a fruit showing the nutlets, natural size.
7. A nutlet, side view, enlarged.

C. E. Faxon del.

CRATÆGUS MALOIDES, Sarg.

CRATÆGUS LUCULENTA, SARG.

CRATÆGUS LUCULENTA, *n. sp.*

Leaves oblong-obovate or rhomboidal, acute or rounded at the apex, crenulate-serrate above the middle, with glandular teeth, gradually narrowed, cuneate and entire below, sometimes divided into short lateral lobes; as they unfold slightly villose above, with short caducous hairs, and furnished below with large tufts of pale tomentum in the axils of the veins, and at maturity thin but firm in texture, dark green and very lustrous on the upper surface, paler and glabrous on the lower surface with the exception of a few scattered hairs along the slender midribs and remote primary veins extending obliquely toward the apex of the leaf, from 3 to 4.5 centimetres long and from 2 to 2.5 centimetres wide; stipules linear, glandular-serrate, caducous; petioles slender, grooved and slightly villose on the upper side at maturity and from 5 to 10 millimetres long; leaves on vigorous shoots usually broadly ovate, more or less deeply lobed above the middle and frequently from 4 to 5 centimetres long and from 3 to 4 centimetres wide. Flowers about 2 centimetres in diameter on elongated slender pedicels in three or four-flowered glabrous corymbs, with linear glandular red caducous bracts and bractlets; calyx-tube broadly obconic, glabrous, the lobes gradually narrowed, acuminate, entire, tipped with minute dark glands; stamens fifteen to twenty; anthers large, dark purple; styles five. Fruit subglobose to short-oblong, pendant on slender pedicels, 9 or 10 millimetres long, bright orange-red and marked by numerous pale dots; flesh thin, yellow, acidulous; nutlets five, about 6 millimetres long, rounded and obscurely ridged on the back.

A shrub, with slender wide-spreading stems from 4 to 8 metres in height, covered with close smooth bark varying from gray to brown, and slender branchlets at first orange-green, bright red-brown during their first season, gray tinged with red in their second year, marked by occasional small pale lenticels, and unarmed or occasionally furnished with slender straight spines rarely more than 3 centimetres in length. Flowers during the first week in March. Fruit ripens in June and early in July.

In low wet clay soil in a forest of Oaks and Palmettos bordering Haw Creek, Volusia County, Florida, *A. H. Curtiss* (No. 6677), July, 1900, March and April, 1901.

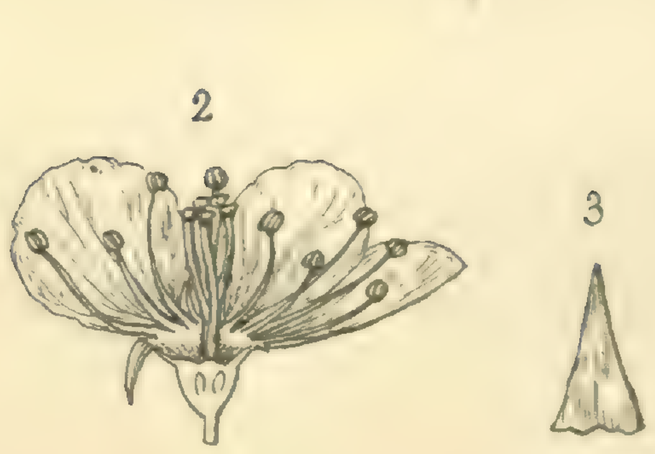
This is another species of the Æstivalis group, distinguished from *Cratægus maloides* by its smaller flowers in few-flowered corymbs, thinner leaves, and by its smaller and much less juicy fruits.

C. S. S.

EXPLANATION OF THE PLATE.

Plate VI. Cratægus luculenta.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit, enlarged.
6. Cross section of a fruit, enlarged.
7. A nutlet, side view, enlarged.
8. A nutlet, rear view, enlarged.



C. E. Faxon del.

CRATÆGUS LUCULENTA, Sarg.

CRATÆGUS FRUTICOSA, SARG.

CRATÆGUS FRUTICOSA, *n. sp.*

Leaves obovate, acute, coarsely and often doubly serrate usually only above the middle, with straight or incurved teeth tipped with small dark red persistent glands, gradually narrowed, cuneate and glandular below; villose as they unfold, especially on the lower surface, at maturity thick and firm in texture, dark yellow-green and glabrous on the upper surface, paler and slightly hairy on the lower surface along the slender yellow midribs and primary veins extending obliquely to the points of the leaf, from 2 to 2.5 centimetres long and from 1.2 to 1.8 centimetres wide; petioles stout, margined above by the decurrent bases of the leaf-blades, villose, pubescent, usually about 5 millimetres long; stipules linear, glandular-serrate, caducous; leaves of vigorous leading shoots often broadly ovate, concave-cuneate or rounded at the wide base, frequently divided into two or three pairs of short acute lateral lobes, coated below, at least while young, with hoary villose pubescence frequently from 3 to 3.5 centimetres long and 3 centimetres wide, their stipules foliaceous, lunate, and coarsely glandular-serrate. Flowers from 1.8 to 2 centimetres in diameter on elongated slender glabrous pedicels, in simple two or three-flowered corymbs often subtended by a solitary flower from the axil of the upper leaf; bracts and bractlets linear and acute, or narrowly obovate, conspicuously glandular-serrate, bright red, caducous; calyx-tube broadly obconic, glabrous, the lobes broad, acuminate, villose on the inner surface, entire or irregularly and coarsely glandular-serrate, reflexed after anthesis; stamens twenty to twenty-two; anthers pale violet; styles usually five, rarely four, dilated into broad stigmas. Fruit solitary or in two or three-fruited clusters, subglobose, light orange-red, lustrous, marked by occasional large pale dots, about 10 millimetres in diameter; calyx enlarged, prominent, the lobes reflexed, often deciduous before the ripening of the fruit; flesh thin, yellow, dry, and mealy; nutlets five or rarely four, thin and irregularly grooved and slightly ridged on the back, light-colored, about 8 millimetres long.

A shrub, from 2 to 3 metres tall, with several slender curving branches, and thin zigzag branchlets pale reddish brown and coated, when they first appear, with matted pale hairs usually persistent during their first season, and ashy gray or gray tinged with red in their second year, and armed with numerous stout straight lustrous spines from 2 to 2.5 centimetres long. Flowers about April 10. Fruit ripens early in August.

Low wet prairies in clay soil near Seville, Volusia County, Florida, *A. H. Curtiss* (No. 6703 in part), August, 1900, April, 1901.

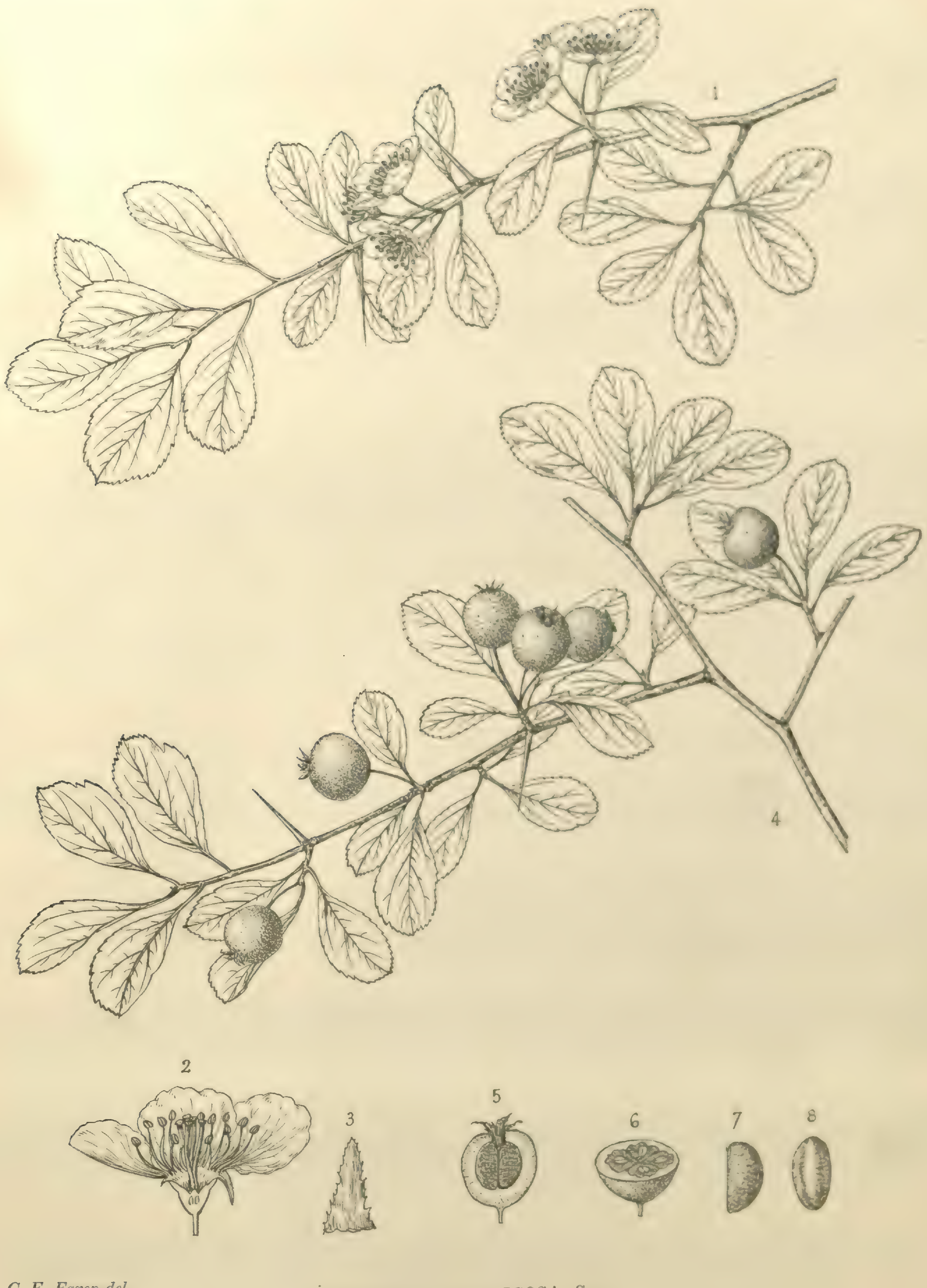
The structure of the flowers and the texture of the leaves of *Cratægus fruticosa* suggest an association with the species of the Æstivalis group. It differs from them, however, in its later flowers, which appear when the leaves are nearly half grown and in its much later ripening fruit.

C. S. S.

EXPLANATION OF THE PLATE.

Plate VII. Cratægus fruticosa.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit, enlarged.
6. Cross section of a fruit, enlarged.
7. A nutlet, side view, enlarged.
8. A nutlet, rear view, enlarged.



C. E. Faxon del.

CRATÆGUS FRUTICOSA, Sarg.

CRATÆGUS PALUDOSA, SARG.

CRATÆGUS PALUDOSA, *n. sp.*

Leaves rhomboidal to oblong-obovate, acute at the apex, coarsely and often doubly serrate above the middle, with straight or incurved teeth, gradually narrowed, cuneate and entire below, at first slightly villose above, furnished below with small persistent tufts of pale hairs in the axils of the principal veins, at maturity subcoriaceous, dark yellow-green and lustrous on the upper surface, pale on the lower surface, from 2.5 to 3.5 centimetres long and from 1.4 to 1.8 centimetres wide; petioles slender, deeply grooved, narrowly winged above, at first villose, with long white pale hairs, soon glabrous, from 1.3 to 2 centimetres long, with thin midribs and two or three pairs of slender veins extending obliquely toward the apex of the leaf; stipules linear, bright red, caducous; leaves on vigorous leading shoots mostly broadly obovate, acute, often three-lobed; sometimes 4 centimetres long and from 3 to 3.5 centimetres wide. Flowers about 1.6 centimetres in diameter in four or five-flowered slightly villose corymbs; bracts and bractlets linear, bright red, caducous; calyx-tube broadly obconic, glabrous, the lobes gradually narrowed from broad bases, acute, entire or coarsely glandular-serrate; stamens twenty to twenty-seven; anthers large, dark purple; styles five. Fruit oblong, subglobose, 9 or 10 millimetres long, orange-red, lustrous, marked by small scattered dark dots; calyx-tube elongated, prominent, the lobes reflexed, mostly deciduous before the ripening of the fruit; flesh thick, yellow, dry, and mealy; nutlets five, thin, obscurely grooved on the back, about 1 centimetre long.

A shrub, from 4 to 5 metres tall, with numerous wide-spreading slender stems drooping to the ground and covered with pale smooth bark separating into longitudinal fissures and rarely into thin plate-like scales, and slender slightly zigzag branchlets light yellow-green and sparingly villose when they first appear, light red-brown and marked by occasional large pale lenticels during their first year and ashy gray the following season, and armed with slender nearly straight lustrous spines from 1 to 3.5 centimetres long. Flowers early in March when the leaves are about one half grown. Fruit ripens early in August.

Borders of wet prairies on Haw Creek, Volusia County, Florida, *A. H. Curtiss* (No. 6678), August 1, 1900; March and September, 1901.

This very distinct Thorn is one of four or five interesting species found by Mr. Curtiss in Volusia County, Florida, in 1900. It belongs with the group of southern small-fruited species, of which *Cratægus viridis*, Linnæus, is the type. From the other species of this group which are now known it differs in its few-flowered corymbs, in its large dark purple anthers, more coriaceous leaves, and early ripening fruit.

C. S. S.

EXPLANATION OF THE PLATE.

Plate VIII. Cratægus paludosa.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit, enlarged.
6. Cross section of a fruit, enlarged.
7. A nutlet, side view, enlarged.
8. A nutlet, rear view, enlarged.

C. E. Faxon del.

CRATÆGUS PALUDOSA, Sarg.

EUPATORIUM LOESENERII, ROBINS.

EUPATORIUM LOESENERII, Robinson, *Proc. Am. Acad.* XXXV. 336 (1900).

Leaves opposite, petiolate, broadly ovate, entire, rounded or very obtuse at the apex, cordate or subcordate at the base, from 4 to 7 centimetres long, from 3 to 4.5 centimetres broad, thickish, subpalmately five to seven-nerved from a little above the base, pulverulent and grayish green above, fulvous tomentulose beneath, nerves and anastomosing veins prominent on the lower surface; petioles about 2 centimetres long, spreading, semiterete, deeply furrowed above, pulverulent-tomentulose; inflorescences dense many-headed rounded terminal corymbs; primary bracts petiolate, leaf-like, the ultimate ones much reduced, filiform; pedicels filiform, from 4 to 9 millimetres long; heads small, about 7 millimetres high, about twenty-flowered; involucre campanulate, scarcely half the length of the mature flowers; the scales oblong, obtuse, pulverulent, subequal, appressed; corollas 5 millimetres long, the short proper tube passing almost imperceptibly into a long slender tubular throat, the five-toothed limb relatively short, purplish. Achenes dark-colored, 2 millimetres long, columnar, tapering slightly toward the prominent callous base, the sharp angles slightly hispid.

A round-topped bush, from 1.8 to 2.8 metres high, with much-branched terete stems covered with firm gray longitudinally fissured bark, hard white wood surrounding a small white pith, opposite curved-ascending branches, buff-colored when young, and rather stout nearly terete obscurely striate branchlets clothed with very short almost pulverulent tomentum and leafy chiefly near the summit.

Mexico: calcareous hills, Oaxaca, along the Cuicatlan road, Valley of Oaxaca, at altitudes of from 2100 to 2400 metres, *E. W. Nelson* (No. 1549), October 3, 1894; Las Sedas, at an altitude of 1800 metres, *C. G. Pringle* (No. 6022, distributed as *E. sordidum*), October 30, 1894; San Juan del Estado, at an altitude of 1700 metres, *L. C. Smith* (No. 275), November 4, 1894; Cuauhtilla, *C. & E. Seler* (No. 1537), November 28, 1895.

It seems remarkable that this conspicuous species on the hills of Oaxaca was not observed by Galeotti or the other earlier explorers of the region, but was left for independent and almost simultaneous discovery by the collectors mentioned above. Concerning the country where it flourishes Mr. Pringle writes as follows: "At Las Sedas and westward the region takes the character of billowy hills, thinly covered with dwarfish Oaks and Pines. The rock formation is calcareous and the soil-covering scanty, consisting mainly of soft decomposing rock. Into this water has worn gulches and ravines innumerable, in whose shelter and on the steep bluffs above I gathered a long list of plants fully one third of which have proved to be new species. On these dry and chalky banks *Eupatorium Loeseneri* is at home in company with *Rhus mollis*, Humboldt, Bonpland & Kunth, *Dasylirion serratifolium*, Zuccarini, and such shrubby Salvias as thrive in none but these conditions. It forms a broad round-topped bush. With its numerous clusters of rosy flowers and leaves becoming purple-tinted with age and clad throughout in russet vesture this shrub is a pretty object. The species must be of frequent occurrence on similar hills about the Valley of Oaxaca and away to the westward through the elevated limestone region known as the Misteca Alta."

The species was dedicated to Dr. Theodor Loesener of the Royal Botanical Museum at Berlin.

B. L. ROBINSON.

Gray Herbarium.

EXPLANATION OF THE PLATE.

Plate IX. Eupatorium Loesenerii.

1. A flowering branch, natural size.
2. A head of flowers, enlarged.
3. A flower, enlarged.
4. A flower, corolla laid open, enlarged.
5. An achene, enlarged.

C. E. Faxon del.

EUPATORIUM LOESENERI. Robins.

SENECIO ROBINSONIANUS, GREENM.

SENECIO ROBINSONIANUS, Greenman, *Monogr. Senecio*, 26 (1901); *Engler Bot. Jahrb.* xxxii. 22.

Leaves long-petiolate, ovate-rotund, from 1.5 to 2 decimetres long, nearly or quite as broad, palmately seven to nine-nerved from or just above the more or less truncate or subcordate base, sinuately sublobate, with very shallow sinuses and mucronate-acute lobes, margined with numerous mucronulations, hirtellous-pubescent, densely and permanently lanate-tomentose beneath; petioles from 3.5 to 10 centimetres long, densely tomentose; inflorescence a terminal tomentose thyrsoidal panicle from 2 to 3 decimetres long and from 1 to 1.5 decimetres broad; heads about 8 millimetres high, radiate; involucre calyculate with small setaceous bracteoles more or less imbedded in a flocculent tomentum; bracts of the involucre commonly eight, lance-linear to lance-oblong, 4 millimetres long, obtusish, sparingly tomentulose, the inner scarious-margined; ray-flowers five; tubes slender, about equaling the pappus; rays short, 2 millimetres long, three or four-nerved; disk-flowers about eight. Achenes glabrous.

A shrubby perennial, from 2 to 3 metres high, with terete stems and densely matted tomentose branches.

Mexico: State of Oaxaca, between Nopala and Mixistepec, at altitudes of from 215 to 1230 metres above the sea-level, *E. W. Nelson* (No. 2439), March 5, 1895.

This species belongs to the Palmatinervii, a natural group of some thirty-four species, which in their geographical distribution extend from northern, or more particularly from north-central, Mexico to Costa Rica. The Palmatinervii are characterized by a more or less elongated axis of the inflorescence, and by having palmately nerved leaves. *Senecio Robinsonianus* is a typical representative of the group and is most nearly related to *Senecio roldana*, De Candolle, *Senecio Jaliscanus*, S. Watson, *Senecio albonervius*, Greenman, *Senecio Donnell-Smithii*, Coulter, and *Senecio lanicaulis*, Greenman. From these *Senecio Robinsonianus* is very distinct. The large ovate-rotund leaves, the elongated terminal paniculate inflorescence with the individual heads disposed in little glomerules, and the dense white tomentum of stem, branches, inflorescence, and under leaf-surface render it easily recognizable among all the numerous species of the genus. For the discovery of this species we are indebted to Mr. E. W. Nelson, an indefatigable collector, through whose rich and abundant collections of the past few years our knowledge of the flora of the more remote and less accessible parts of Mexico has been much increased.

Senecio Robinsonianus was named in honor of Professor B. L. Robinson; and specimens of the original, or type, are deposited in the National Herbarium at Washington, the Herbarium of the Royal Botanical Museum at Berlin, and in the Gray Herbarium at Cambridge.

J. M. GREENMAN.

Gray Herbarium.

EXPLANATION OF THE PLATE.

PLATE X. SENECIO ROBINSONIANUS.

1. A panicle of flowers, natural size.
2. Vertical section of a head, showing a disk-flower and a ray-flower, enlarged.
3. A disk-flower, enlarged.
4. A ray-flower, enlarged.
5. An involucre, enlarged.
6. A bract of an involucre, enlarged.
7. A leaf, natural size.

C. E. Faxon del.

SENECIO ROBINSONIANA, Greenm.

STYRAX RAMIREZII, GREENM.

STYRAX RAMIREZII, Greenman, *Proc. Am. Acad.* xxxiv. 568 (1899); xxxv. 309.

Leaves alternate, petiolate, oblong-lanceolate, from 1 to 1.5 decimetres long, from 3 to 6 centimetres broad, acuminate, acute or obtuse, entire, cuneate or rounded at the base, glabrous or essentially so above, paler and minutely stellate-lepidote beneath, the midrib and lateral veins prominent especially beneath, and more or less roughened by whitish or tawny stellate scales. Flowers in axillary secund racemes, 6 centimetres or less in length, including the peduncles, closely ferrugineous-stellate; calyx cupulate, from 5 to 6 millimetres high, about equaling the pedicels, shallowly sinuate, five-dentate, argenteous-lepidote, often with tawny stellate scales intermixed; corolla about 1.5 centimetres long, externally and along the margins of the inner surface of the lobes argenteous-lepidote; filaments and ovary stellate-pubescent. Fruit oblong, from 1 to 1.5 centimetres long, from 6 to 7 millimetres thick, pale green and closely stellate-lepidote over the entire surface.

A tree, from 9 to 12 metres high, the ultimate branches covered with a close ferrugineous-stellate tomentum.

Mexico: State of Morelos, in mountain cañons above Cuernavaca, at an altitude of 2000 metres, *C. G. Pringle* (No. 6848, fl. spec.), May 15, 1898; Sierra de Tepaxtlan, at an altitude of 2310 metres, *C. G. Pringle* (No. 8023, fr. spec.), February 7, 1899, and in the same locality (No. 9000, fl. spec.), May 6, 1900.

The statement in my original description, that the leaves are glabrous and smooth upon both surfaces, or slightly roughened on the prominent midrib and lateral nerves beneath, must be modified as above; and additional material shows that they are often somewhat broader than is indicated by the original specimen, and not unfrequently rounded as well as cuneate at the base.

The genus Styrax is represented in Mexico and Central America by ten known species, and of these *Styrax Ramirezii* seems most nearly related to *Styrax argenteum*, Presl, *Styrax contuminum*, Donnell-Smith, and the recently published *Styrax micranthum*, Perkins. In its geographical distribution *Styrax Ramirezii* is limited apparently to the plateau region of central Mexico, having been found thus far only in the State of Morelos, some sixty-four kilometres from the city of Mexico. As the species grows at rather high altitudes, it is not improbable that it could be successfully introduced into more northern latitudes. The light green foliage, the numerous axillary one-sided floral clusters, with somewhat drooping flowers, make it a most attractive tree.

Styrax Ramirezii was named in honor of Señor Dr. José Ramirez, Director of the Instituto Medico Nacional of the city of Mexico, one of the foremost naturalists of Mexico.

J. M. GREENMAN.

Gray Herbarium.

EXPLANATION OF THE PLATE.

Plate XI. Styrax Ramirezii.

1. A flowering branch, natural size.
2. A corolla laid open, enlarged.
3. A pistil, enlarged.
4. Portion of a cluster of fruit, natural size.
5. Vertical section of a fruit, enlarged.

C. E. Faxon del.

STYRAX RAMIREZII, Greenm.

FAXONANTHUS, GREENM.

FAXONANTHUS, *n. gen.*

Calyx 5(–6)-parted; segments narrow. Corolla broad, campanulate; lobes 5, rotund, somewhat unequal, the posterior lobe outermost in the bud, the anterior innermost. Stamens 4, in pairs, adnate to the base of the corolla, included; anther-cells divaricate, confluent, 1-celled. Ovary 2-celled, many-ovuled; style filiform; stigma subbilamellate. Capsule 2-valved; valves again dividing into two equal parts. Seeds small, pitted. Suffruticose plants with alternate or scattered leaves. Pedicels solitary in the axils. Flowers conspicuous.

FAXONANTHUS PRINGLEI, *n. sp.*

Leaves linear or spatulate-linear, 0.5 to 1.5 centimetres long, 1 to 3 millimetres broad, obtuse or acute, entire, glabrous and viscid, mostly present towards the free ends of the ultimately ascending minutely puberulent branches; the earlier leaves in falling leaving a raised elongated-elliptical subviscid portion of the originally petiolar base; pedicels short, 3 to 6 millimetres long; calyx about 8 millimetres high; corolla dark purple (or in the dried state somewhat blue), broadly campanulate, 2 to 2.5 centimetres high and equally broad, zygomorphic; corolla-tube anteriorly ventricose, pubescent and yellow-maculate at least in the dried state; calyx and the dehiscent capsule persistent long after the dissemination of the seeds.

A low shrub, 1 to 6 decimetres high and broad, with much-branched stems covered with a grayish bark.

Mexico: near Tehuacan, *C. G. Pringle* (No. 8594), 1901.

Faxonanthus is one of the most showy of the Mexican shrubs. Mr. Pringle, the collector, states that "it grows in clumps a foot or two in height and breadth on the white chalky hills near Tehuacan. With its fine dark green foliage and deep purple flowers the plant possesses a unique beauty."

The genus is named after the late Edwin Faxon, who, through a long period of botanical activity, did much to increase the knowledge of the flora of New England and to enrich many herbaria. I take pleasure in associating also with this plant the name of the well-known and sagacious collector, Cyrus G. Pringle.

J. M. GREENMAN.

Gray Herbarium.

EXPLANATION OF THE PLATE.

PLATE XII. FAXONANTHUS PRINGLEI.

1. A flowering branch, natural size.
2. A corolla laid open, enlarged.
3. A flower, the corolla removed, enlarged.
4. A pistil, enlarged.
5. A fruit, the calyx removed, enlarged.

C. E. Faxon del.

FAXONANTHUS PRINGLEI, Greenm.

EHRETIA VISCOSA, Fernald.

Ehretia viscosa, *n. sp.*

Leaves ovate, from 4.5 to 7.5 centimetres long, from 3 to 5 centimetres broad, subentire or crenate-serrate especially toward the short-acuminate tip, rounded or subcordate at the base, scabrous above, softly canescent beneath, the nerves and the petiole (from 6 to 12 millimetres long) densely glandular, panicles terminating the branchlets, from 4 to 5 centimetres high, nearly as broad, densely flowered; the rachis and pedicels viscid; calyx campanulate, puberulent, cleft half way to the base into broadly deltoid lobes; corolla white, 5 millimetres long, the exserted tube somewhat exceeding the recurved oblong lobes; stamens exserted, slightly exceeding the glabrous truncate style. Fruit oblong, 5 or 6 millimetres long, said to be white.

A large round-topped tree, about 12 metres high, with a trunk 1 metre or more in diameter, branches covered with smooth brown bark, and branchlets densely pubescent with soft spreading hairs, and viscid with intermixed brown glands.

Mexico: Morelos, near Cuernavaca, *C. G. Pringle* (No. 7777), May 29, 1899; *J. N. Rose & Walter Hough* (No. 4371), May 27–30, 1899; Guanajuato, ravine near the city of Guanajuato, *A. Dugès*, 1891.

This handsome broad-topped tree of the mountains of central Mexico resembles in its foliage and flowering panicles *Ehretia Mexicana*, S. Watson, and *Ehretia cordifolia*, Robinson, trees which were discovered by Mr. Pringle in western Mexico, and which are known only from the valleys of the Sierra Madre in the State of Jalisco. From both these species of western Mexico, *Ehretia viscosa* is easily distinguished by the glandular pubescence which is conspicuous upon the young portions of the tree, but is entirely wanting in *Ehretia Mexicana* and *Ehretia cordifolia*. *Ehretia viscosa* is apparently rare, and by a singular coincidence a solitary tree only is known to botanists at each of the stations from which our material has been collected. The tree from which the Cuernavaca specimens were collected is a very full and healthy specimen not far from the railroad. At Guanajuato the single tree known to Professor Dugès is a large specimen growing in a ravine near the city, where it was possibly introduced from farther south. This tree is known to the Mexicans as "Capulin blanco," because of the resemblance of its fruit to that of the Mexican Capulin, *Prunus serotina*, var. *salicifolia*, Koehne.

M. L. Fernald.

Gray Herbarium.

EXPLANATION OF THE PLATE.

Plate XIII. Ehretia viscosa.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A corolla laid open, enlarged.
4. An anther, rear and front views, enlarged.
5. A flower, the corolla removed, enlarged.
6. Vertical section of a flower, the corolla removed, enlarged.
7. A fruiting branch, natural size.

C. E. Faxon del.

EHRETIA VISCOSA, Fern.

BERBERIS SIEBOLDI, Miq.

Berberis Sieboldi, Miquel, *Ann. Mus. Lugd. Bat.* ii. 69 (1865–66); *Prol. Fl. Jap.* 1. — Regel, *Act. Hort. Petrop.* ii. 418. — Franchet & Savatier, *Enum. Pl. Jap.* i. 22. — Matsumura, *Fig. Descr. Pl. Koishikawa Bot. Gard.* ii. t. 5, A. — T. Ito, *Jour. Linn. Soc.* xxii. 427. — Koehne, *Deutsche Dendr.* 169.

Berberis vulgaris, Matsumura, *Fig. Descr. Pl. Koishikawa Bot. Gard.* ii. text to t. 5 (1883).

Leaves oblong-obovate to oblong or oblong-oblanceolate, from 3 to 7 centimetres long, acute or obtusish and mucronulate at the apex, gradually narrowed at the base into short petioles from 1 to 5 millimetres long, or sessile, densely and setosely ciliate and often revolute on the margins, dull green on the upper side, bright green and somewhat reticulate at maturity on the lower surface, deep vinous red in the autumn. Flowers appearing in May and June, pale yellow, about 8 millimetres in diameter, in almost umbel-like three to six-flowered peduncled racemes, nodding or spreading, shorter than the leaves; peduncles from 1 to 1.25 centimetres long; pedicels from 3 to 5 millimetres long, furnished at the base with an ovate-lanceolate bract, terminated by a bristle-like point, and from one third to one fifth as long as the pedicel; sepals six, the three outer orbicular-ovate, the inner longer and oval-ovate; petals deeply emarginate and usually incurved at the apex, about as long as the outer sepals; stamens about one third shorter than the petals, with filaments about 1.5 as long as the anthers; ovary ovoid with a sessile stigma. Fruits subglobose to ovoid, about 6 millimetres high, bright red and lustrous, rather dry, from two to five on a peduncle 1.5 to 2.5 centimetres long; seeds usually two, ovoid, 3 millimetres long, grayish brown, minutely punctulate, somewhat lustrous.

A low broad roundish shrub, from 30 to 75 centimetres high, with numerous upright or spreading stems clothed with light grayish brown longitudinally fissured bark, the branches of the previous year dark reddish brown, angular, compressed and two-edged toward the apex, and armed with three-parted slender brown spines sometimes 12 millimetres long.

Japan: in the mountainous regions of Hokkaido and Hondo (ex Ito); Hondo, on the Nagasendo near Metaki, *C. S. Sargent*, 1892.

Berberis Sieboldi seems most nearly allied to *Berberis umbellata*, Wallich, and to *Berberis serrata*, Koehne, but is easily distinguished by its setosely ciliate leaves. According to T. Ito *Berberis Sieboldi* is the Hirohano Hebinoborazu of Keiske Ito (*Somoku Dsusetsu Arb.* ii. t. 5, B). It is one of the most distinct of the cultivated Barberries on account of its foliage and habit. The purplish color of the unfolding leaves marked with green veins is specially noticeable, and the foliage is also very handsome in autumn, when it turns to a bright vinous red. Like that of *Berberis Thunbergi*, De Candolle, the rather dry fruit retains its bright color unchanged until the following spring. *Berberis Sieboldi* was introduced into the Arnold Arboretum by seeds collected in 1892 by Professor Sargent in Japan. It has proved perfectly hardy in the vicinity of Boston.

Alfred Rehder.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate XIV. Berberis Sieboldi.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A bractlet from the base of the flower, enlarged.
4. An outer sepal, enlarged.
5. An inner sepal, enlarged.
6. A petal, enlarged.
7. A stamen, enlarged.
8. A pistil, enlarged.
9. A fruiting branch, natural size.
10. Vertical section of a fruit, enlarged.
11. A seed, enlarged.

C. E. Faxon del.

BERBERIS SIEBOLDI, Miq.

ILEX SERRATA, THUNB.

ILEX SERRATA, Thunberg, *Fl. Jap.* 78 (1784). — De Candolle, *Prodr.* ii. 16. — Franchet & Savatier, *Enum. Pl. Jap.* i. 78. — Rehder, *Cycl. Am. Hort.* ii. 798; *Mitt. Deutsche Dendr. Gesell.* x. 111. — Loesener, *Nov. Act. Nat. Car.* lxxviii. 467 (*Monogr. Aquifol.*).

ILEX SIEBOLDI, Miquel, *Versl. Med. Kon. Akad. Weten.* ser. 2, ii. 84 (1866); *Ann. Mus. Lugd. Bat.* iii. 104; *Prol. Fl. Jap.* 268. — Franchet & Savatier, *Enum. Pl. Jap.* i. 77. — Maximowicz, *Mém. Acad. Sci. St. Pétersbourg*, sér. 7, xxix. No. 3, 48. — Nakagawa, *Tokyo Bot. Mag.* xiii. 108. — Shirasawa, *Icon. Ess. For. Jap.* i. 101, t. 61.

ILEX SERRATA var. SIEBOLDI, Rehder, *Cycl. Am. Hort.* ii. 798 (1900); *Mitt. Deutsche Dendr. Gesell.* x. 111. — Loesener, *Nov. Act. Car.* lxxviii. 468 (*Monogr. Aquifol.*).

Leaves deciduous, elliptic or ovate to ovate or obovate-oblong, rarely lanceolate, 2.5 to 8 centimetres long, rarely smaller, acuminate, narrowed at the base into glabrous or puberulous petioles from 4 to 10 millimetres long, finely and densely serrate, with spreading acuminate teeth, on the upper surface dull green and glabrous, or pubescent along the midrib, with short hairs, lighter green and finely pubescent or glabrous on the lower surface, with from six to nine prominent secondary veins impressed above. Flowers appearing in June and July in the axils of the leaves and of the basal bracts of the branches, diœcious; staminate flowers generally 4-merous with a conic pistillode, in simple to thrice dichotomous, from three to seven or rarely to fifteen-flowered, short-pedunculate or sessile cymes; pedicels slender, from 0.5 to 1.5 millimetres long, puberulous or glabrous; pistillate flowers generally 5-merous, with staminodes nearly like stamens, disposed in simple or twice dichotomous, from one to three or rarely to seven-flowered short-pedunculate or sessile cymes; pedicels from 0.5 to 2.5 millimetres long, puberulous or glabrous; flowers of both sexes hardly differing in size, from 4 to 5 millimetres in diameter; calyx minutely hirsute, broadly cup-shaped, with four ovate triangular ciliolate lobes, rounded or subacute, as long as the tube in the pistillate, longer in the staminate flowers; petals about thrice as long as the calyx-teeth, connate at the base, ovate in the pistillate, oval in the staminate flower, whitish, or tinged with pink particularly on the outer surface; stamens somewhat shorter than the petals; anthers ovoid, almost twice as long as the free part of the filaments, in the pistillate flowers cordate-ovate, longer than the free part, but shorter than the whole of the filament; ovary conic-ovoid with a sessile four, rarely five or six-lobed stigma, four or rarely five to six-celled; ovule solitary. Fruit a globose drupe ripening in October, bright red, from 4 to 6 millimetres in diameter; stones usually four, from 2.5 to 3.2 millimetres long, ovoid-oblong, obtusely trigonous, yellowish white, smooth; seed light brown, minutely undulate-rugulose.

A shrub or small tree, often 4 or 5 metres high, or occasionally taller, with a trunk scarcely attaining 20 or exceptionally 30 centimetres in diameter and covered with smooth bark, dark gray or greenish gray spreading or upright branches, and slender somewhat zigzag branchlets puberulous when young or glabrous.

Japan: in the lower mountainous regions of Hondo mostly near the borders of streams and in low ground; and in Kiu-shiu.

Besides the type which has been distinguished as *Ilex serrata*, var. *Sieboldi*, the following well-marked varieties have been described: —

Ilex serrata, var. *argutidens*, Rehder, *Cycl. Am. Hort.* ii. 798 (1900); *Mitt. Deutsche Dendr. Gesell.* x. 111. — Loesener, *Nov. Act. Nat. Car.* lxxviii. 468 (*Monogr. Aquifol.*).

Ilex argutidens, Miquel, *Versl. Med. Kon. Akad. Weten.* ser. 2, ii. 84 (1866); *Ann. Mus. Lugd. Bat.* iii. 104; *Prol. Fl. Jap.* 268. — Franchet & Savatier, *Enum. Pl. Jap.* i. 76.

Ilex serrata, Maximowicz, *Mém. Acad. Sci. St. Pétersbourg*, sér. 7, xxix. No. 3, 48 (1881). — Yatabe, *Tokyo Bot. Mag.* vi. 158.

Branchlets and leaves glabrous, the latter usually smaller; flowers oftener 4-merous, pinkish. In Hondo; not reported from Kiu-shiu.

Ilex serrata, var. *subtilis*, Loesener, *Nov. Act. Nat. Car.* (*Monogr. Aquifol.*) lxxviii. 469 (1901).

Ilex subtilis, Miquel, *Versl. Med. Kon. Akad. Weten.* ser. 2, ii. 84 (1866); *Ann. Mus. Ludg. Bat.* iii. 107; *Prol. Fl. Jap.* 271. — Franchet & Savatier, *Enum. Pl. Jap.* i. 78.

Ilex Sieboldi, var. *subtilis*, Yatabe, *Tokyo Bot. Mag.* vi. 158 (1892).

A dwarf form with lanceolate leaves about 1.5 centimetres long and 0.4 centimetres broad or even smaller, pubescent beneath; flowers smaller, usually 4-merous. Cultivated in Japan.

Ilex serrata is closely allied to *Ilex verticillata*, Gray, which differs in its larger and more coarsely serrate leaves, in the usually 6 to 9-merous flowers and in the size of the fruit, which is almost twice as large. Like *Ilex verticillata*,[1] the Japanese species has produced forms with yellow and also with whitish berries.[2] On account of its attractive fruit, which remains a long time on the branches after the leaves have fallen, *Ilex serrata* is a favorite plant with the Japanese, who often plant it for ornament. In autumn the leafless branches loaded with the bright red berries are brought into the cities and sold in the streets for the decoration of dwelling-houses.[3]

Ilex serrata has been cultivated in the Arnold Arboretum for many years and has proved perfectly hardy. It seems to be still little known in European gardens. It was first introduced into those of the United States about 1866 by Thomas Hogg, while the var. *argutidens* was raised from seeds collected by Professor Sargent in Japan in 1892. The second variety is probably not yet in cultivation outside of Japan. As an ornamental plant *Ilex serrata* is chiefly valued for the effect which the attractive berries produce after the leaves have fallen; and though less showy, it is more graceful than the better known *Ilex verticillata*.

Alfred Rehder.

Arnold Arboretum.

[1] Robinson, *Rhodora*, ii. 106. This form has been in cultivation in the Arnold Arboretum since 1885.
[2] Bean, *Gard. Chron.* ser. 3, xxviii. 322.
[3] Sargent, *Garden & Forest*, vi. 122; *For. Fl. Jap.* 25.

EXPLANATION OF THE PLATE.

Plate XV. Ilex serrata.

1. A branch with staminate flowers, natural size.
2. A tetramerous staminate flower, enlarged.
3. A pentamerous staminate flower, enlarged.
4. Vertical section of a staminate flower, enlarged.
5. A branch with pistillate flowers, natural size.
6. A pistillate flower, enlarged.
7. Vertical section of a pistillate flower, enlarged.
8. A fruiting branch, natural size.
9. A fruit divided transversely, enlarged.
10. A seed, enlarged.

C. E. Faxon del.

ILEX SERRATA, Thunb.

ACER CAPILLIPES, MAXIM.

ACER CAPILLIPES, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xii. 225 (1867); xxvi. 441; *Mél. Biol.* vi. 367; x. 597. — Miquel, *Arch. Néerland.* ii. 477. — Franchet & Savatier, *Enum. Pl. Jap.* i. 88. — Pax, *Bot. Jahrb.* vii. 246; *Engler Pflanzenreich*, 8 Heft (iv. 163) 67. —Rehder, *Mitt. Deutsche Dendr. Gesell.* x. 115.

ACER PENNSYLVANICUM, var. CAPILLIPES, Wesmael, *Bull. Soc. Bot. Belg.* xxix. 62 (1890).

Leaves long-petioled, membranaceous, glabrous, orbicular-ovate, from 8 to 12 centimetres long, from 6 to 8 centimetres broad, rounded or subcordate at the base, three or rarely five-lobed, sharply and doubly serrate, the middle lobe much larger than the others, triangular-ovate, acuminate, the lateral lobes very short, acuminate, spreading outward, the upper surface dark green, opaque, the lower surface light green usually with reddish veins; petioles slender, from 3 to 5 centimetres long, glabrous, usually red. Flowers appearing with the leaves; racemes short-peduncled, slender, drooping, from 7 to 10 centimetres long, many-flowered, glabrous; pedicels filiform, from 8 to 15 millimetres long; flowers greenish white, 8 or 9 millimetres in diameter; sepals spatulate, 3 millimetres long; petals obovate, 4 millimetres long; stamens perigynous, shorter than the petals; filaments glabrous; disk rather small. Fruits glabrous, about 3 millimetres long, light reddish or yellowish brown, numerous in pendulous racemes; wings straight, rounded at the apex, 0.5 centimetres broad, spreading at a very obtuse angle or almost horizontal.

A tree, about 10 metres in height, with a trunk sometimes 30 centimetres in diameter, erect greenish brown branches conspicuously marked by pale longitudinal stripes, glabrous branchlets usually tinged more or less with purple and sometimes slightly covered toward the apex with a glaucous bloom, and stalked winter-buds with two pairs of valvate scales, those of the outer pair glabrous and inclosing the densely silky-pubescent scales of the inner pair.

Japan: Hondo, Province of Shenano, *Tschonoski*, 1864 (in flower), banks of the Kisogawa near Agamatsu on the Nagasendo, *C. S. Sargent*, October 5, 1892 (fruit).

Acer capillipes is distinguished by its glabrous leaves from all other three-lobed species of the section Macracantha of Pax, except from *Acer tegmentosum*, Maximowicz, and *Acer pectinatum*, Wallich, which also have glabrous foliage, but rather short-pediceled flowers and fruits. *Acer pectinatum* may be distinguished by the setosely pointed teeth and the longer lateral lobes pointing forward of the leaves, and *Acer tegmentosum* by the lateral lobes of the leaves pointing forward and the green color of the unfolding leaves, while in *Acer capillipes*, at least in the cultivated plants, the young unfolding foliage is bright red.

Acer capillipes, which appears to have been collected only twice, and is probably extremely rare, is a handsome tree similar in habit to *Acer Pennsylvanicum*, Linnæus, and *Acer rufinerve*, Siebold & Zuccarini, but easily distinguished from them in spring by the bright red color of the unfolding leaves, which is usually retained through the season on the branchlets, petioles and the veins, and adds much to the beauty of the plant. Late in autumn the leaves assume a dark purple color. *Acer capillipes* has proved hardy at the Arnold Arboretum, where it was introduced in 1892 by Professor Sargent, who collected seeds in Japan.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate XVI. Acer capillipes.

1. A flowering branch, natural size (from specimens collected by Tschonoski and now in the Gray Herbarium).
2. A staminate flower, enlarged.
3. A sepal, enlarged.
4. A petal, enlarged.
5. A stamen, enlarged.
6. A fruiting branch, natural size (collected by Sargent).
7. Vertical section of a nut, enlarged.
8. An embryo, enlarged.

C. E. Faxon del.

ACER CAPILLIPES, Maxim.

ACER TSCHONOSKII, MAXIM.

ACER TSCHONOSKII, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg,* xxxi. 24 (1886); *Mél. Biol.* xii. 432. — Pax, *Bot. Jahrb.* xi. 80; *Engler Pflanzenreich,* 8 Heft (iv. 163) 70.

ACER CAPILLIPES, Sargent, *Garden and Forest,* vi. 153 (not Maximowicz) (1893); *Forest Fl. Jap.* 30.

Leaves slender-petioled, membranaceous, orbicular-ovate, 4 to 10 centimetres long, cordate at the base, deeply five or rarely seven-lobed, the lobes reaching about half way to the middle, triangular-ovate, long-acuminate, incisely and sharply double-serrate, with incurved teeth acuminate with setose tips, bright green and glabrous on the upper surface, lighter green beneath and rufously villose along the primary veins, almost glabrous at maturity except in the axils of the veins near the base of the leaf; petioles slender, from 2 to 5 centimetres long, occasionally longer, rufously villose near the base of the blade. Flowers appearing with the leaves; racemes from six to ten-flowered, from 1 to 1.5 centimetres long; peduncle from 4 to 5.5 centimetres long, glabrous; pedicels filiform, the lower 1 centimetre long, the upper shorter; flowers from 8 to 10 millimetres in diameter, greenish white; sepals oblong, about one third shorter than the oblong-obovate petals; staminate flowers with stamens slightly shorter than the petals, the glabrous filaments many times longer than the oval anthers; disk intrastaminal with a rudimentary pistil in the middle; pistillate flowers with rudimentary short stamens; pistil glabrous, the style much shorter than the spreading slender stigmas. Fruits light yellowish brown, in racemes of three to six; pedicels filiform, from 1 to 1.5 centimetres long; wings spreading at an obtuse or almost right angle, each samara from 2 to 2.3 centimetres long, from 8 to 10 millimetres broad, the wing incurved and almost truncate at the apex.

A shrub or small tree, about 5 metres high, with gray or grayish brown smooth-barked branches, glabrous greenish branchlets usually tinged with purple, and small stalked winter-buds covered by two pairs of valvate scales, the outer glabrous and entirely inclosing the inner, which are silky-pubescent.

Japan: in the mountain woods of Hondo up to altitudes of 800 or 900 metres, *Tanaka, Tschonoski, Rein, Faurie* (ex Pax); Mt. Hakkoda, near Aomori, up to 1400 metres, *C. S. Sargent,* October 3, 1892; Uzen, Herb. Imp. Univ. Tokyo; Hokkaido, Raiden Mount, Province of Shiribeshi, *K. Sugiyama,* July, 1888.

Acer Tschonoskii is closely related to *Acer micranthum,* Siebold & Zuccarini, which differs from it chiefly in its longer many-flowered racemes, and in its shorter and stouter pedicels, while the sepals are only about half as long as the obovate petals, and the under sides of the leaves are glabrous with the exception of the tufts in the axils of the veins. *Acer Tschonoskii* is a shrubby tree with small graceful foliage somewhat similar in appearance to *Acer palmatum,* Thunberg. It is proved hardy at the Arnold Arboretum, where it was introduced in 1892 by Professor Sargent, who collected seeds in Japan, and where it flowered this year for the first time. Seeds of this species were first sent from the Arboretum to some European gardens under the name of *Acer capillipes.*

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate XVII. Acer Tschonoskii.

1. A flowering branch, natural size.
2. A staminate flower, enlarged.
3. Vertical section of a pistillate flower, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a nut.

C. E. Faxon del.

ACER TSCHONOSKII, Maxim.

MALUS HALLIANA, KOEHNE.

MALUS HALLIANA, Koehne, *Gatt. Pomaceen*, 27 (1890); *Deutsche Dendr.* 261.
PYRUS HALLIANA, Voss, *Vilmorin Blumeng.* ed. 3, i. 277 (1896).
PYRUS PARKMANI, *Hort.*

Leaves convolute in the bud, petioled, ovate-oblong to elliptic-oblong, from 4 to 7 centimetres long, acute or somewhat acuminate, narrowed or rounded at the base, serrulate, with appressed obtusish teeth, chartaceous at maturity, dark green, with impressed veins, lustrous and glabrous above with the exception of the hairy and glandular midrib, lighter green and glabrous below usually with a purplish midrib; petioles from 1 to 1.2 centimetres long, pubescent when young, glabrous at maturity. Flowers andro-polygamous, appearing with the leaves in from two to six-flowered umbels, rose-colored, from 3.5 to 4 centimetres in diameter; pedicels glabrous, from 2.5 to 4 centimetres long, like the calyx dark purple; sepals ovate, glabrous on the outer surface, villose within, about one half as long as the calyx-tube; petals ovate, rounded, sparingly villose at the unguiculate base and often with scattered hairs on the inner surface toward the apex; stamens about twenty, of unequal length, the longest about two thirds the length of the petals; filaments glabrous; styles four or five, connate almost to the middle and densely villose below the middle, glabrous at the base. Fruit subglobose, about 6 millimetres in diameter, dark purple, four or five-celled, abruptly contracted at the base into the slightly thickened straight spreading pedicel and crowned by the small scar of the deciduous calyx deciduous before the fruit ripens; seeds broadly ovate, slightly compressed, 4 millimetres long.

A small tree, from 3 to 5 metres high, often shrubby, with spreading branches forming a broad open head, a short stem covered with smooth gray bark, and slender usually dark purple branchlets sparingly hairy at first and soon glabrous.

Japan: probably only in gardens; the only Japanese specimen I have seen is from the Tokyo Botanical Garden, collected by *K. Miyabe* and called *Pyrus spectabilis*. According to Koehne *Malus Halliana* was also collected by *Hilgendorf* and by *Maximowicz*, and by the latter distributed as *Cratægus alnifolia*, Siebold & Zuccarini, but a fruiting specimen from the collection of Maximowicz under this name in the Gray Herbarium certainly belongs to *Malus Toringo*, Siebold. Like many other plants cultivated in Japanese gardens, it may have been introduced from China, although it does not seem to have yet been collected there.

Malus Halliana belongs to the subsection Gymnomeles and is allied to *Malus baccata*, Desfontaines, and *Malus floribunda*, Siebold; from the first it is distinguished by the leathery leaves, the color of the flowers, the much shorter sepals, the purple calyx and pedicels, and the four or five-celled very late ripening fruit; from *Malus floribunda* it is distinguished by the convolute vernation of the glabrous leaves, the color of the larger flowers, the shorter sepals, and the glabrous purple pedicels and calyx. In foliage and flowers it much resembles *Malus spectabilis*, Desfontaines, which, however, differs by its pubescence and the much larger fruit crowned by the persistent calyx.

From all other species of *Malus*, and in fact from all Sorbæ, except *Chænomeles Japonica*, Lindley (*Pyrus Japonica*, Thunberg), *Malus Halliana* differs in its polygamous flowers, which seem to have hitherto escaped notice. There is at least one staminate flower in each umbel, and this is always terminal; sometimes there are two or three, but the number of staminate flowers rarely exceeds that of the perfect ones. In the staminate flowers there is no trace of reduced pistils, which are present, though often very minute, in the sterile flowers of *Chænomeles Japonica*.

Malus Halliana is one of the most beautiful of the Asiatic Crab-apples. The delicate color of the large flowers gracefully nodding on slender dark-colored pedicels give it a very distinct and charming appearance; it is also handsome in

summer with its dark glossy foliage, which remains on the branches until late in autumn, when it assumes a dark purple color. *Malus Halliana* was first introduced about 1863 into American gardens by Dr. G. R. Hall, an American physician, who resided for many years in China and Japan. The first mention of this beautiful Crab-apple seems to be in a note in the *Rural New Yorker*[1] of 1882 under the name of *Malus Halliana*; eight years afterwards a photograph of a flowering branch was published in *Garden and Forest*,[2] but without technical description. A photograph of a flowering tree showing the habit together with that of a flowering branch may be found in Möller's *Deutsche Gärtner-Zeitung* of 1899.[3] In the vicinity of Boston *Malus Halliana* has proved hardy, but Massachusetts seems to be the northern limit of its hardiness in the eastern states.

ALFRED REHDER.

Arnold Arboretum.

[1] See *The Garden*, xxii. 162 (1882).

[2] Sargent, *Gard. & For.* i. 152, f. 30 (1888).

[3] Rehder, *Möller Deutsche Gärtner-Zeit.* xiv. 457, f. (1899).

EXPLANATION OF THE PLATE.

PLATE XVIII. MALUS HALLIANA.

1. A flowering branch, natural size.
2. A flowering branch, natural size (from a Japanese specimen).
3. Vertical section of a staminate flower, enlarged.
4. Vertical section of a perfect flower, enlarged.
5. A sepal, enlarged.
6. A petal, enlarged.
7. A fruiting branch, natural size.
8. Vertical section of a fruit, enlarged.
9. Cross section of a fruit, enlarged.
10. A seed, enlarged.

C. E. Faxon del.

MALUS HALLIANA, Koehne

VIBURNUM WRIGHTII, MIQ.

VIBURNUM WRIGHTII, Miquel, *Ann. Mus. Lugd. Bat.* ii. 267 (1865–66); *Prol. Fl. Jap.* 155.— Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 490; *Mél. Biol.* x. 667. — Nakagawa, *Tokyo Bot. Mag.* ii. 76. — Rehder, *Cycl. Am. Hort.* iv. 1926.

VIBURNUM EROSUM, Gray, *Perry Exped.* ii. 313 (not Thunberg) (1856).

Leaves exstipulate, petioled, orbicular to broadly ovate or obovate, from 6 to 14 centimetres long, abruptly acuminate, rounded or broadly cuneate at the base, coarsely and sinuately dentate, with from twelve to twenty, or rarely twenty-five apiculate teeth on each side, and with from six to eight pairs of almost parallel lateral veins; bright green on the upper surface and lighter green below, with short hairs on the upper side of the veins and with scattered long hairs on the lower side, otherwise glabrous or furnished with scattered simple or fasciculate hairs on both sides when young; petioles glabrous or covered with long scattered hairs, from 8 to 18 millimetres long. Flowers appearing in June in upright pedunculate cymes; peduncles from 1.5 to 3 millimetres long, hirsute; cymes five-rayed, from 5 to 10 centimetres broad, finely pubescent and glandular; flowers sessile or short-pediceled, with small caducous bracts at the base, arranged in raylets of the third and fourth order; calyx-teeth glabrous, orbicular-ovate, short; corolla rotate, from 5 to 6 millimetres in diameter, glabrous, with orbicular-ovate lobes; stamens exceeding the corolla; style short and thick, with a two-lobed stigma. Drupe subglobose, scarlet, about 1 centimetre high, juicy; stone broadly ovate, pointed, much flattened, 6 millimetres broad, yellowish white, rugulose and furnished with five fine longitudinal lines. Seed brown, the testa minutely punctulate.

An erect shrub, attaining a height of 3 metres, with upright spreading grayish brown branches, slender branchlets which are glabrous or furnished with scattered spreading hairs, and rather large winter-buds covered by two pairs of imbricate scales which are yellowish pubescent toward the apex, or those of the outer pair glabrous.

Japan: Hokkaido, near Hakodate, *C. Wright*, 1853–56; *Albrecht*, 1860; *C. S. Sargent*, near Kakumi Hot Springs, September 29, and Sapporo, September 17, 1892; Sapporo, *E. Tokubuchi*, September 8, 1894; Hondo, Mountains of Niko, *Tschonoski*, 1864; on Fuji-san, *K. Watanabe*, July 29, 1891; Chokaizan, *J. H. Veitch*, September 15, 1892; near Fukishima, on the Nagasendo, *C. S. Sargent*, October 25, 1892; Kiu-shiu (ex Nakagawa). China: Szechuen, *Henry* (No. 6262).

Viburnum Wrightii is closely allied to *Viburnum dilatatum*, Thunberg, and to *Viburnum phlebotrichum*, Siebold & Zuccarini. From *Viburnum dilatatum* it is chiefly distinguished by its almost glabrous leaves, glabrous flowers, and the larger and more juicy fruits. *Viburnum phlebotrichum*, which is similar in pubescence and in fruit, has much smaller and narrower leaves, with stamens shorter than the corolla and smaller slender-stemmed glabrous cymes with purplish peduncles and calyx. Hemsley [1] united *Viburnum Wrightii* with *Viburnum phlebotrichum*, saying that Szechuen specimens connect those two species. According to specimens which I have before me, both species seem to grow in Szechuen, but are readily distinguished, although the Chinese specimens of *Viburnum phlebotrichum* have longer stamens than those from Japan and resemble in this respect *Viburnum Wrightii*. From the other localities mentioned by Hemsley I have seen no specimens. *Viburnum Willeanum*, Graebner,[2] appears to differ little from *Viburnum Wrightii* as here described. Dr. Henry's specimen from Szechuen quoted above agrees well with Graebner's description in regard to the large inflorescence, which is 10 centimetres in diameter, and to the smaller flowers,

[1] Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 354.

[2] Graebner, *Bot. Jahrb.* xxix. 589 (*Flora von Central China*).

but the leaves are not obovate, and are entire only in the lower third, while those of *Viburnum Willeanum* are described as rhombic-obovate, sinuately dentate only above the middle and attaining a length of but 8 centimetres.

Viburnum Wrightii is a handsome shrub, especially ornamental in autumn with its large clusters of glossy scarlet fruits resembling those of *Viburnum Opulus*, Linnæus, although somewhat smaller. It is also attractive when in flower and when the foliage turns to a dark red in autumn. It was introduced from Japan in 1892 by Professor Sargent into the Arnold Arboretum, where it has proved hardy in a sheltered position or with some protection during the winter.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE XIX. VIBURNUM WRIGHTII.

1. A flowering branch, natural size.
2. A flower with the corolla opened, enlarged.
3. A fruiting branch, natural size.
4. A stone, enlarged.
5. Cross section of a stone, enlarged.

C. E. Faxon del.

VIBURNUM WRIGHTII, Miq.

LONICERA SACCATA, REHD.

LONICERA, *n. sp.*

LONICERA No. 32 (Xylostum) *sp. nov.?* Hemsley, *Jour. Linn. Soc.* xxiii. 368 (1888).

LONICERA MICROPHYLLA, Graebner, *Bot. Jahrb.* xxix. 595 (*Flora von Central China*) (1901).

Leaves elliptic-oblong or rhombic-oblong to oblong, from 1.5 to 5 centimetres long, from 6 to 15 millimetres broad, obtuse, narrowed at the base into an almost glabrous or sparingly hairy petiole from 1 to 2 millimetres in length, blade dark green and sparingly pubescent on the upper surface, sometimes only along the midrib, glaucescent on the lower surface, and pubescent when young, becoming glabrous at maturity, except on the rather prominent yellowish veins. Flowers in pairs on glabrous slender nodding peduncles from 1 to 2.5 centimetres long, in the axils of the lower leaves; bracts narrowly oblong, acute, sparingly ciliate, exceeding the calyx; bractlets none; ovaries wholly connate, each ovary three-celled, cells three-ovuled; calyx small, cup-shaped, indistinctly five-toothed, sparingly ciliate or wholly glabrous; corolla tubular, 10 millimetres long, slightly and gradually widened from the base, apparently white suffused with pink, glabrous on the outer surface, hairy within, limb short, about 2 millimetres long, with 5 ovate upright lobes; stamens inserted in the upper third of the tube, about as long as the limb; filaments glabrous, scarcely longer than the linear-oblong anthers; style exserted, villose below the middle with long scattered hairs. Fruit a subglobose berry consisting of the two connate ovaries, scarlet, from 6 to 8 millimetres in diameter, many- (to eighteen-) seeded; seeds oval, 4.5 millimetres long, compressed, smooth, light brown.

An upright shrub from 0.5 to 1.5 metres high, with slender branches covered with light grayish brown shredding bark, glabrous young branchlets more or less purple, and small winter-buds covered by several pairs of lanceolate minute scales, the innermost foliaceous.

China: Sze-chuen, *Henry* (No. 5680, 5680 A); Mount Omei, *Faber* (No. 66); Hupeh, *Henry* (No. 5306, 5306 A, 5311, 4053); Shen-si, *Giraldi* (No. 128).

Numbers 5680, 5680 A, 5306, 5306 A, and 5311 may be considered the type of the species. The other specimens quoted differ somewhat in their shorter and broader more obovate leaves, more pubescent above, and are present only in fruiting specimens. *Lonicera saccata* is most nearly related to *Lonicera Tangutica*, Maximowicz, and its allies, differing from them chiefly by the prominent saccose gibbosity at the base of the tube and the three-celled ovary. From *Lonicera obovata*, Royle, and *Lonicera ramosissima*, Franchet & Savatier, which it resembles in the shape of the corolla, it is readily distinguished by the absence of the bractlets, by the foliage, and by the three-celled ovary. From Dr. Henry's collection *Lonicera saccata* was distributed as *Lonicera microphylla*, Pallas, var., but that species differs widely in the more or less distinctly bilabiate corolla, the shape of the leaves, and the two-celled ovary.

ALFRED REHDER.
Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate XX. Lonicera saccata.

1. A flowering branch, natural size.
2. A pair of flowers, enlarged.
3. A corolla laid open, enlarged.
4. An ovary with style, enlarged.
5. Cross section of a pair of ovaries, enlarged.
6. Vertical section of an ovary, enlarged.
7. A fruiting branch, natural size.
8. A seed, enlarged.

C. E. Faxon del.

LONICERA SACCATA, Rehd.

LONICERA KŒHNEANA, REHD.

LONICERA KŒHNEANA, *n. sp.*

Leaves petioled, ovate, obovate or rhombic-ovate, from 6 to 10 centimetres long, acuminate, rounded or narrowed at the base, above bright green and sparingly appressed pubescent, becoming almost glabrous at maturity, below grayish green or glaucescent and covered with soft grayish pubescence and reticulate at maturity, with the veins more or less dilated at their base; petioles hirsute, from 5 to 10 millimetres long. Flowers in peduncled pairs from the axils of the lower and middle leaves; peduncle from 1.5 to 2.5 centimetres long, erect, rather stout, pilose; bracts linear, pubescent, about as long as the ovary; bractlets suborbicular, half as long or as long as the ovary, long-ciliate and sparingly pubescent, enveloping the ovaries like a cupule, the pair of the same flower almost wholly connate; ovaries distinct, globose, from 1 to 2 millimetres in diameter, glandular and short-pubescent, three-celled; calyx about half as long as the ovary, cupulate, divided to the middle into five ovate obtuse pubescent and ciliate teeth; corolla bilabiate, about 1.5 centimetres long, yellow, densely appressed pubescent and somewhat glandular on the outside; tube short and wide, prominently gibbous at the base, villose within; limb about one and a half times as long as tube, the upper lips divided into four short broadly ovate lobes; stamens about as long as the corolla; filaments hirsute at the base; anthers linear-oblong on the under side with a longitudinal row of setose hairs; style pubescent to the apex, as long as the stamens. Fruit subglobose, apparently red.

An upright probably robust shrub with stout branches covered with gray somewhat shreddy bark, green branchlets more or less tinged with purple, and sparingly pilose, and rather large ovate pointed winter-buds covered by several pairs of imbricate ovate to ovate-lanceolate grayish pubescent scales.

China: Sze-chuen, *Henry* (Nos. 5613, 5894), Farges (No. 1204); Hupeh, *Henry* (No. 6052); Yunnan, *Delavay* (No. 444); Shen-si, *Giraldi* (Nos. 123, 124, 126).

Dr. Henry's specimens from Sze-chuen constitute the type of the species; the others differ but slightly in the size of the leaves or the pubescence of the flowers. *Lonicera Kœhneana* is most nearly related to *Lonicera chrysantha*, Turczaninow, and has hitherto been referred to that species. It differs from it, however, in the large connate bractlets, the pubescent globose and larger ovaries, the densely appressed pubescent corolla with a wide and strongly gibbous tube, the setosely pubescent anthers, and in the soft-pubescent under side of the leaves and their firmer texture. *Lonicera chrysantha* has much smaller ovate bractlets wholly distinct or only slightly connate at the base, ovoid small ovaries about 1 millimetre in diameter and only glandular, a more slender corolla with scattered spreading hairs on the outer surface, anthers glabrous or furnished with a few setose hairs at the base, and leaves which are pilose chiefly on the veins beneath.

This species is dedicated to Professor E. Koehne, the distinguished German botanist, whose arrangement of the cultivated species of Lonicera in his *Deutsche Dendrologie* is the best and most natural hitherto published.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate XXI. Lonicera Kœhneana.

1. A flowering branch, natural size.
2. A corolla, enlarged.
3. A corolla laid open, enlarged.
4. An anther, enlarged.
5. A pair of ovaries with the style, enlarged.
6. Cross section of an ovary, enlarged.
7. A fruiting branch, natural size.

C. E. Faxon del.

LONICERA KOEHNEANA, Rehd.

LONICERA FERRUGINEA, REHD.

LONICERA FERRUGINEA, *n. sp.*

Leaves persistent, ovate to oblong-ovate or ovate-lanceolate, from 6 to 10 millimetres long, acuminate, cordate or subcordate at the base, coriaceous, on the upper surface dark green, glossy and almost glabrous except on the midrib, with impressed veins, on the under surface light green, reticulate, and covered with ferrugineous pubescence, particularly along the veins; petioles from 4 to 6 millimetres long, densely ferrugineous-hirsute. Flowers in axillary heads consisting of several short-stalked or almost sessile pairs of flowers and forming terminal panicles; peduncles of the lower heads from 1 to 2 centimetres long; bracts linear, densely hirsute, exceeding the calyx; bractlets ovate, about one half as long as the ovary, densely hirsute; calyx-teeth ovate-lanceolate, hirsute, somewhat shorter than the ovary; ovaries distinct, densely hirsute; corolla bilabiate, from 2.3 to 2.8 centimetres long, yellow, densely hirsute on the outside, the tube slender, sparingly hairy within, about one third longer than the limb, the upper lip divided from one third to one half of its length into four oblong lobes; stamens exceeding the limb; filaments sparingly hirsute below the middle; style glabrous, as long as the stamens. Fruit black, ovoid, crowned by the persistent calyx.

A twining shrub with slender branches; the young branchlets, petioles, peduncles, and nearly every part of the plant except the upper surface of the leaves covered with ferrugineous hirsute pubescence.

China: Yunnan, Szemeo forest, at 1700 metres altitude, *Henry* (No. 11921, 11921 B).

A fruiting specimen (Henry, No. 11921 A) collected in the same locality at a lower altitude differs from the type by its thinner oblong-ovate to oblong-lanceolate leaves and more slender peduncles. *Lonicera ferruginea* is most nearly related to *Lonicera macrantha*, De Candolle, differing from it chiefly by the corolla being only half as long, by the hirsute ovaries, and by its dense ferrugineous pubescence; from *Lonicera Giraldii* ined., to which it is similar in appearance, *Lonicera ferruginea* differs in the glabrous style, the hirsute ovary, and the more slender and somewhat longer corolla-tube.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate XXII. Lonicera ferruginea.

1. A flowering branch, natural size.
2. A corolla laid open, enlarged.
3. A pair of ovaries with the style, enlarged.
4. Cross section of an ovary.

C. E. Faxon del.

LONICERA FERRUGINEA, Rehd.

LONICERA ARIZONICA, REHD.

LONICERA ARIZONICA, *n. sp.*

LONICERA CILIOSA, Rose, *Contrib. U. S. Nat. Herb.* i. 121 (not Poiret) (1891).

Leaves ovate or sometimes oval, from 2 to 4.5 centimetres long, truncate or broadly cuneate at the base, obtuse, bright green above, glaucous beneath, ciliate, otherwise glabrous, or rarely somewhat villous-pubescent on the lower surface while young; petioles slender, from 6 to 12 millimetres long, sparingly pilose and glandular, sometimes furnished with stipular appendages at the base, only the uppermost pair of leaves on the flowering branches connate into an elliptic to oblong-elliptic disk, pointed at both ends, from 4 to 8 centimetres long, and somewhat constricted in the middle. Flowers appearing in June in terminal pedunculate one to three-whorled heads, the whole inflorescence glabrous; peduncles from 0.5 to 2.5 centimetres long; bractlets ovate, about one third as long as the ovary, the two subtending bracts of each whorl oblong, as long as the ovaries; calyx scarcely one third as long as the ovary, cupulate with five short triangular-ovate teeth; corolla yellow, more or less tinged with scarlet outside, from 3.5 to 4.5 centimetres long, narrowly tubular-funnelform, with a short five-lobed limb, the tube somewhat inflated or a little gibbous above the base, slightly contracted below the middle, glabrous on the outer surface, hairy within below the insertion of the stamens, the lobes somewhat unequal, the longest from 6 to 8 millimetres long; stamens about as long as the tube, with glabrous filaments inserted somewhat above the middle of the corolla; style glabrous, exserted.

A low bushy or sarmentose shrub, with slender often drooping branches covered with light brownish yellow shreddy bark, glabrous green young branchlets usually tinged with purple, and covered with a glaucous bloom.

Mountains of Arizona, from 2000 to 3000 metres above the sea-level: Rincon Mountains, June 19, 1884, *C. G. Pringle;* Willow Spring, June 16 to 18, 1890, *E. Palmer* (No. 537); Santa Rita Mountain, June 6, 1881, *C. G. Pringle* (No. 306); San Francisco Mountains, July 4, 1869, *E. Palmer;* June 23, 1891, *D. T. MacDougal;* July 15, 1892, *J. W. Toumey;* Mormon Lake, June 12, 1898, *D. T. MacDougal* (No. 104).

The specimens from the Rincon Mountains and Willow Spring constitute the type of the species; those from the Santa Rita Mountains and part of those from Mormon Lake differ in the more gibbous and less slender corolla and slightly exserted stamens, while those from the San Francisco Mountains and part of those from Mormon Lake have shorter petioles and the under surface of the leaves somewhat pubescent. *Lonicera Arizonica* is allied to *Lonicera pilosa*, Willdenow, and *Lonicera ciliosa*, Poiret, and hitherto has been usually referred to the latter species. From *Lonicera pilosa* it differs in the thin obtuse long-ciliate but otherwise usually glabrous leaves, the less gibbous corolla, and shorter bractlets; from *Lonicera ciliosa* by the slender scarlet corolla with almost equal lobes, the glabrous style, and the much smaller slender-petioled leaves. In shape and color of the corolla *Lonicera Arizonica* much resembles *Lonicera sempervirens*, Linnæus, but is readily distinguished from that species by the thin ciliate leaves and the short head-like inflorescence.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE XXIII. LONICERA ARIZONICA.

1. A flowering branch, natural size.
2. A flower, natural size.
3. A flower of the form from the Santa Rita Mountains, natural size.
4. A corolla laid open, enlarged.
5. An ovary with style, enlarged.

C. E. Faxon del.

LONICERA ARIZONICA, Rehd.

LONICERA GRIFFITHII, Hook. f. & Thoms.

Lonicera Griffithii, Hooker f. & Thomson, *Jour. Linn. Soc.* ii. 173 (1858). — Aitchison, *Jour. Linn. Soc.* xviii. 64. — Buser, *Boissier Fl. Orient.* Suppl. 275.

Leaves petiolate, oblong to orbicular, from 3 to 5 centimetres long, obtuse, dark green above, light green below, the lower ones oblong to ovate-oblong, usually narrowed at the base, the middle ones ovate to orbicular-ovate, rounded or subcordate at the base and, like the lower ones, on slender petioles from 8 to 12 millimetres long, the uppermost pair usually orbicular, emarginate and subcordate, short-petiolate. Flowers appearing in July and August in terminal pedunculate heads consisting of two or three, rarely four, whorls of flowers; peduncle from 0.5 to 2 centimetres long, hirsute, and glandular; each whorl subtended by six ovate-lanceolate hirsute bracts, the two longer ones mostly exceeding the ovaries, the others half as long; the eight bractlets of each whorl connate into a common cupule glabrous or sparingly hairy and glandular, as high as the ovaries and enveloping them completely; ovaries distinct, hairy and glandular; calyx with five ovate ciliate teeth about one third as long as the ovary; corolla bilabiate, 2.5 centimetres long, white and flushed with rose color, hirsute and glandular on the outer surface, the tube glabrous within, slender, gradually narrowed toward the base, slightly shorter than the limb, the upper lip divided about one third into short oval lobes; stamens shorter than the limb; filaments glabrous; style slightly longer than stamens, with long spreading hairs about the middle.

A twining shrub, quite glabrous except the bracts, calyx-teeth, corolla and peduncle of the inflorescence, with branches covered with chestnut-brown bark peeling off in thin flakes and leaving the stems grayish white.

Afghanistan: without locality, *Griffith;* Kuram Valley, common from the base of Péwárkotal at an altitude of 2500 metres, to Alikhél and Káratígha, *Aitchison* (No. 535).

Lonicera Griffithii is most nearly related to *Lonicera Periclymenum*, Linnæus, from which it differs in the connate bractlets and the shape of the leaves. By the connate bractlets, a peculiarity which seems to have escaped hitherto unnoticed, *Lonicera Griffithii* differs from all other species of the section Periclymenum (§ Caprifolium DC.) and may constitute the subsection *Thoracianthæ* (from θωρακεῖον, a breastwork, because the cupule surrounds the flowers of each whorl like a breastwork).

Outside of the sections Periclymenum and Nintoa connate bractlets forming a cupule tightly inclosing the ovaries are known in several species, as in *Lonicera Iberica*, Bieberstein, *Lonicera cærulea*, Linnæus,[1] and some other less well-known species. Analogous to the mode of union in these species which have the middle flower of the cyme suppressed, in *Lonicera Griffithii* with three-flowered sessile cymes only the bractlets of the two lateral flowers unite and form the cupule, inclosing in *Lonicera Griffithii* also the middle flower, and connect at the same time with the bractlets of the opposite cyme; thus they form a cupule inclosing the whole whorl. The bracts of the middle flowers, which bear in their axils the two lateral flowers, remain free and appear together with the subtending bracts of the two opposite whorls as six free bracts below the cupule. The tendency of opposite leaves to unite, which shows itself in other species of the section Periclymenum by the union of the pairs of leaves below the inflorescence, seems to be transferred in this species to the group of transformed leaves immediately below the individual flowers.

Lonicera Griffithii would probably prove to be a handsome ornamental climbing shrub if introduced into cultivation, for Aitchison speaks of it as "a magnificent climber, with very handsome rose-colored flowers." In the northern

[1] *Lonicera cærulea*, which is described even in the most recent manuals as having connate ovaries and no bractlets, has really distinct ovaries covered tightly by a cupule of connate bractlets. This cupule grows with the ovaries and affects at maturity the appearance of a coating of a single fruit similar to that of the connate berries of *Lonicera oblongifolia*, Hooker. So far as I know this fact was first pointed out by E. Koehne in his *Deutsche Dendrologie*, pp. 542, 545 (1893), and was also shown two years earlier in his drawings of Lonicera reproduced by K. Fritsch in Engler & Prantl, *Natürl. Pflanzenfam.* iv. pt. iv. 167.

United States, however, and in northern Europe it can hardly be expected to thrive without protection during the winter.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE XXIV. LONICERA GRIFFITHII.

1. A flowering branch, natural size.
2. Diagram of a whorl of flowers.
3. A corolla laid open, and half of the lowest whorl of the inflorescence, enlarged.
4. An ovary, enlarged.

C. E. Faxon del.

LONICERA GRIFFITHII, H. f. & T.

ENKIANTHUS SUBSESSILIS, MAKINO.

ENKIANTHUS SUBSESSILIS, Makino, *Tokyo Bot. Mag.* viii. 215 (1894).

ANDROMEDA SUBSESSILIS, Miquel, *Ann. Mus. Lugd. Bat.* i. 32 (1863–64); ii. 162; *Prol. Fl. Jap.* 94. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg,* xviii. 50; *Mel. Biol.* viii. 619. — Franchet & Savatier, *Enum. Pl. Jap.* i. 285.

ANDROMEDA NIKOENSIS, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg,* xxxi. 496 (1888); *Mél. Biol.* xii. 741.

ENKIANTHUS NIKOENSIS, Makino, *Tokyo Bot. Mag.* viii. 215 (1894). — Palibin, *Scripta Botanica Hort. Petrop.* fasc. xv. 8 (*Revisio Gen. Enkianthus*). — Rehder, *Mitt. Deutsche Dendr. Gesell.* x. 113.

Leaves membranaceous, elliptic to rhombic-obovate, from 2 to 4.5 centimetres long, acute and apiculate at the apex, gradually narrowed below, and nearly sessile or borne on petioles from 1 to 5 millimetres long, crenulate-serrate, with incurved awned teeth, dark green on the upper surface, with short whitish hairs on the midrib, light green or glaucescent beneath, with rufous hairs along the midrib and on the veins, or only on the midrib. Flowers appearing in May or June with the leaves; racemes short-pedunculate, slender, nodding, from 4 to 6 centimetres long, from six to twelve-flowered, without bracts at the base; rachis villose; pedicels glabrous, slender, from 2 to 2.5 centimetres long, with a caducous linear bract at the base; calyx three times shorter than the corolla, divided almost to the base into ovate acuminate ciliate lobes; corolla globose-ovate, urceolate, white, 0.5 centimetres long, with a short five-lobed recurved limb, its lobes ovate-oblong; stamens about half as long as the corolla; filaments villose below the middle, dilated at the base; anthers glabrous, oblong with two awns at the apex as long as the cells; style glabrous, filiform, as long as the corolla; ovary five-celled. Capsules in nodding racemes, ovoid, 4 millimetres long, light brown; pedicels straight, thickened at the apex; valves furrowed at the back; seeds oblong, obtusely trigonous, 3 millimetres long, light brown, with a minutely reticulate testa.

A bushy shrub, from 1 to 3 metres in height, with irregularly whorled upright branches covered with gray smooth bark, and sparingly hairy or almost glabrous young branchlets.

Japan: Hondo, on the Nikko Mountains, *Savatier, Matsumura, Tschonoski* (ex *Palibin*), near Lake Chuzenzi, September 3 and November 3, 1892, *C. S. Sargent;* Province Shenano, Kinposan, at 1000 metres altitude, *Tschonoski* (ex *Palibin*).

Enkianthus subsessilis belongs to the section Andromedina of Palibin, distinguished by the urceolate corolla and the straight pedicels of the capsules. The only other species of this section is *Enkianthus Japonicus*, Hooker f., which is readily distinguished by the corolla having five gibbosities at the base and by the umbellate inflorescence with upright pedicels.

As an ornamental plant *Enkianthus subsessilis* is less handsome than the other species in cultivation, as the white flowers are very small, but, like that of the other species, the foliage assumes a brilliant red color in the autumn. It was introduced into the Arnold Arboretum by Professor Sargent, who collected seeds in Japan in 1892. It has proved hardy in the Arboretum, although it did not flower until 1901. I also saw it in bloom in the same year in Monsieur M. L. de Vilmorin's collection at Les Barres, France.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate XXV. Enkianthus subsessilis.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A stamen, enlarged.
4. A flower with the corolla and two sepals removed, enlarged.
5. A fruiting branch, natural size.
6. A fruit, enlarged.
7. Cross section of a fruit, enlarged.
8. A seed, enlarged.

C. E. Faxon del.

ENKIANTHUS SUBSESSILIS, Makino

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Cambridge, Mass., U. S. A.

SILVA OF NORTH AMERICA

IN September, 1890, Messrs. Houghton, Mifflin & Company announced the publication of Sargent's *Silva of North America* in twelve quarto volumes, illustrated with six hundred plates engraved in Paris under the direction of A. Riocreux from drawings made by C. E. Faxon. The last of these volumes was published in January, 1899, the twelve volumes containing six hundred and twenty plates.

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HARVARD UNIVERSITY

AND EDITED BY

CHARLES SPRAGUE SARGENT

Director of the Arnold Arboretum; Author of
The Silva of North America

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CRATÆGUS PALMERI
CRATÆGUS DALLASIANA
CRATÆGUS FASTOSA
CRATÆGUS TRELEASEI
CRATÆGUS SPECIOSA
CRATÆGUS SMITHII
CRATÆGUS MICRACANTHA
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ERIOLOBUS TSCHONOSKII
RIBES FASCICULATUM
CORNUS PURPUSI
CORNUS ARNOLDIANA
CORNUS BRACHYPODA
VIBURNUM SARGENTI
VIBURNUM VENOSUM
LONICERA MYRTILLUS
LONICERA THIBETICA
LONICERA TRAGOPHYLLA
TECOMA HYBRIDA
PICEA MORINDOIDES
SOLANUM MOLINUM
EUPHORBIA LUCISMITHII

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TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

THIS work consists of a series of plates, accompanied by brief descriptions, of new or little known trees and shrubs. It is edited by Professor C. S. Sargent, the author of *The Silva of North America* and the Director of the Arnold Arboretum of Harvard University, with the assistance of a number of specialists; and the plates are reproductions of original drawings made by Mr. C. E. Faxon, the most skillful and experienced botanical draftsman in America, whose work is familiar to the readers of Professor Sargent's *Silva* and of *Garden and Forest.* The material which serves as a basis for the work has been derived largely from the living collections and herbarium of the Arnold Arboretum. It will not be confined wholly to North American plants, but will include also the woody plants of other regions, especially those of the northern hemisphere which may be expected to flourish in the gardens of the United States and Europe, and those of special commercial or economic interest and value. This publication does not duplicate in any way *The Silva of North America,* but is supplementary to that publication, as from time to time it will contain descriptions and figures of trees newly discovered in North America.

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GUATTERIA GRANDIFLORA, Donn. Sm.

Guatteria grandiflora, J. Donnell Smith, *Bot. Gazette*, xiv. 25 (1889).

Younger leaves linear-lanceolate, pilose beneath on the midrib; the older obovate or elliptical-oblong, from 12 to 20 centimetres long, from 4 to 7 centimetres broad, shortly cuspidate, cuneate at the base, coriaceous, glabrescent; petioles from 2 to 4 millimetres long, glabrous. Peduncles lateral from near the apex of the branchlets, solitary, from 1.5 to 2.5 centimetres long; flowers solitary, or usually from 2 to 6 in a corymbiform dichotomous cyme; bracts deciduous; pedicels from 1 to 3 centimetres long; sepals oblong-ovate, acute, 8 millimetres long, pubescent on both surfaces; petals subequal, oblong or elliptical-oblong, obtuse, from 3 to 4.5 centimetres long, velvety-pubescent, fleshy, the interior 3 tuberculate-papillose in a triangular space within near the base; apex of the torus concave; connective broadly dilated above the anthers, pulverulent; ovaries linear, with pubescent angles, twice longer than the style; stigma pulverulent. Berries nine to twelve, obtusely ellipsoid, 2.2 centimetres long, 1.2 centimetres thick, thrice longer than the stout stipe; seed rugulose, plicatures of the seed-coat very broad and intruding nearly to the centre of the albumen.

A tree, with glabrous branchlets and pubescent inflorescences. Guatemala: Department of Alta Verapaz; forests of Hacienda Pansamalá, at an altitude of 1250 metres, *Freiherr H. von Türckheim*, May 1887 (No. 1235 of my Series of Central American Plants); Hacienda Cubilquitz, at an altitude of 350 metres, *von Türckheim*, May, 1901 (No. 7816 of same Series).

This species is remarkable by its composite inflorescence, large flowers, and cleft albumen. It was originally described from imperfect material that exhibited only one-flowered peduncles.

Duplicates have been presented to the following Herbaria: Arnold Arboretum; Harvard University; Smithsonian Institution; Columbia University; Royal Bot. Gardens, Kew; British Museum; Königl. Bot. Museum, Berlin; Bot. Museum der Universität, Munich; Jardin des Plantes, Paris.

John Donnell Smith.

Baltimore.

EXPLANATION OF THE PLATE.

Plate XXVI. Guatteria grandiflora.

1. A flowering branch, natural size.
2. Posterior view of a flower, enlarged.
3. An interior petal, enlarged.
4. Vertical section of a torus, enlarged.
5. A stamen, front and rear views, enlarged.
6. A pistil, enlarged.
7. A cluster of berries, natural size.
8. A seed, enlarged.
9. Cross section of a seed, enlarged.
10. Vertical section of a seed, enlarged.

GUATTERIA GRANDIFLORA, Donn. Sm.

GUATTERIA DOLICHOPODA, Donn. Sm.

Guatteria dolichopoda, J. Donnell Smith, *Bot. Gazette*, xxiii. 2 (1897); *Pittier Primitiæ Floræ Costaricensis*, ii. 11.

Leaves lanceolate or elliptical-oblong, caudate-acuminate, acute at the base, from 12 to 18 centimetres long, from 3 to 5.5 centimetres broad, chartaceous, sparsely pilulose, at length glabrescent above; lateral nerves patent, veins minutely reticulate; petioles from 3 to 5 millimetres long, pilose. Peduncles axillary, solitary, one-flowered, from 3 to 4 centimetres long, pilose; bract at base and at the articulation below its middle oblong-ovate, from 2 to 4 millimetres long, glabrous above. Sepals ovate, acuminate, 5 millimetres long, glabrous within. Petals oblong, obtuse, somewhat unequal, from 1.9 to 2.2 centimetres long, from 6 to 9 millimetres broad, their lower half externally yellow-sericeous, elsewhere pubescent; apex of the torus excavate; ovaries linear, pilose; style short. Berries from thirty to fifty in number, green, ellipsoid, 8 millimetres long, 5 millimetres broad; stipes red, very slender, from 2.3 to 3.2 centimetres long; seed punctate, albumen penetrated by numerous linear protrusions of the seed-coat.

A tree, about 6 or 7 metres high, of irregular form, with sarmentose drooping branches, the ultimate ones clad with a dusky, patent pubescence; leaf-buds yellow-sericeous.

Costa Rica: Llanuras de Santa Clara, Hacienda La Concepción, at an altitude of 250 metres, *J. Donnell Smith*, February, 1896 (No. 6429 ex Pl. Guat. &c. quas ed. Donn. Sm.); forests of Xirores, Talamanca, at an altitude of 100 metres, *Pittier and Tonduz*, February, 1895 (No. 9166).

To this species are probably to be referred also the following numbers of the last named collectors, but the specimens seen exhibit neither developed flowers nor fruit: No. 10958 from Cañas Gordas, at an altitude of 1100 metres, March, 1897; No. 12970 from Rio De Las Vueltas, Tucurrique, on the Pacific slope, at an altitude of 635 metres, January, 1899.

Guatteria dolichopoda, as observed by me, occurs along rivers in the plains that lie at the foot of the great mountain-range of Costa Rica, some twenty miles back from the eastern coast. It attracts attention more by the abundant umbelliform clusters of fruit than by the flowers. They are conspicuous by the extremely numerous green berries contrasting with their coral-red filiform stalks.

Duplicates of No. 6429 may be found in the following Herbaria: Arnold Arboretum; Harvard University; Smithsonian Institution; Columbia University; Missouri Bot. Garden; Royal Bot. Gardens, Kew; British Museum; Königl. Bot. Museum, Berlin; Bot. Museum der Universität, Munich; Boissier Herbarium, Geneva.

John Donnell Smith.

Baltimore.

EXPLANATION OF THE PLATE.

PLATE XXVII. GUATTERIA DOLICHOPODA.

1. A flowering branch, natural size.
2. A flower, posterior view, enlarged.
3. A flower, anterior view, enlarged.
4. Vertical section of a torus, enlarged.
5. A stamen, front and rear views, enlarged.
6. A pistil enlarged.
7. A fruiting branch, natural size.
8. A seed divided transversely, enlarged.
9. Vertical section of a seed, enlarged.

GUATTERIA DOLICHOPODA, Donn. Sm.

CRATÆGUS REVERCHONI, SARG.

CRATÆGUS REVERCHONI, *n. sp.*

Leaves oval to obovate, acute, concave-cuneate and entire at the base, finely crenately serrate above, with gland-tipped teeth, nearly fully grown when the flowers open and then membranaceous, yellow-green and slightly villose near the base of the midribs on the upper surface, pale and glabrous on the lower surface; at maturity coriaceous, dark green and lustrous above, light yellow-green below, from 3 to 3.5 centimetres long, from 2 to 2.5 centimetres wide, with stout yellow midribs and five or six pairs of thin primary veins arching obliquely to the apex of the leaf; petioles stout, wing-margined nearly to the base, grooved, from 8 to 9 millimetres long; stipules linear, minute, turning red before falling, caducous; on leading shoots leaves usually nearly orbicular, rarely elliptical or ovate, coarsely serrate and occasionally slightly lobed, generally about 3.5 centimetres in diameter, with short broad-winged glandular petioles, bright red or rose color like the base of the thick midribs. Flowers from 8 to 9 millimetres in diameter on slender pedicels, in compact few-flowered thin-branched glabrous compound corymbs; calyx-tube narrowly obconic, the lobes slender, acuminate, tipped with small red glands, entire or slightly undulate or obscurely serrate on the margins; stamens ten to fifteen; anthers rose color; styles three to five, usually five. Fruit on slender elongated pedicels in drooping, few-fruited clusters, subglobose, often slightly broader than high, light scarlet, lustrous marked by occasional large dark dots, about 1 centimetre in diameter; calyx small, sessile, with a narrow deep cavity and elongated acuminate nearly entire lobes gradually narrowed from broad bases, mostly deciduous from the ripe fruit; flesh thick, light yellow, sweet and juicy; nutlets usually four, ridged on the back, with a broad rounded prominent ridge, from 6 to 7 millimetres in length.

A shrub, from 1 to 3 metres in height, with numerous stems rarely 1 decimetre in diameter and slender erect zigzag glabrous branchlets dull orange-brown when they first appear, soon becoming light red-brown and lustrous, and marked by numerous small pale lenticels, light red-brown in their second year and ultimately ashy gray, and armed with slender nearly straight red-brown or purple shining spines from 4 to 7 centimetres in length, often long persistent on the old stems and then occasionally from 1 to 1.5 decimetres long and furnished with numerous long lateral spines pointing upward. Flowers at the end of April or early in May. Fruit ripens the middle of September and then gradually falls during several weeks.

Upland prairies in rich black limestone soil, usually along the borders of woods near small streams, or occasionally isolated on the open prairie and then spreading into broad thickets. Dallas County, Texas: common; *J. Reverchon*, April, 1880, July, 1899, April and September, 1902.

I am glad to associate with this plant, which is one of the most distinct species of the Crus-galli Group, the name of the accomplished botanist and indefatigable collector, Jules Reverchon, who first made it known.

C. S. S.

EXPLANATION OF THE PLATE.

Plate XXVIII. Cratægus Reverchoni.

1. A fruiting branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. Front view of a nutlet, enlarged.
7. Rear view of a nutlet, enlarged.
8. End of a terminal branchlet, natural size.

CRATÆGUS REVERCHONI, Sarg.

CRATÆGUS PALMERI, SARG.

CRATAEGUS PALMERI, *n. sp.*

Glabrous. Leaves broadly oval to obovate, rounded or acute or short-pointed at the apex, gradually narrowed and cuneate at the entire base, coarsely serrate above, with straight gland-tipped teeth; nearly fully grown when the flowers open and then very thin, dark green and lustrous above, pale bluish green below; at maturity coriaceous, dark green and lustrous on the upper surface, paler on the lower surface, from 4 to 6 centimetres long, from 3 to 4.5 centimetres wide, with slender yellow midribs and four or five pairs of very thin primary veins; petioles stout, slightly wing-margined toward the apex, grooved, often rose-colored in the autumn, about 1 centimetre in length; stipules linear, acuminate, often falcate, glandular, caducous; on vigorous shoots leaves oblong-ovate to elliptical, usually acute, coarsely serrate, occasionally laterally lobed, glandular at the base, with stipitate dark glands, from 6 to 7 centimetres long and from 4 to 5 centimetres wide. Flowers about 1.2 centimetres in diameter on slender pedicels, in compact many-flowered thin-branched compound corymbs; bracts and bractlets linear, minute, caducous; calyx-tube narrowly obconic, the lobes slender, acuminate, tipped with small dark glands, entire or slightly serrate; stamens ten; anthers pale yellow; styles three, surrounded at the base by a thin ring of pale tomentum. Fruit on slender elongated pedicels, in few-fruited drooping clusters, subglobose, bright cherry red marked by large pale dots, from 8 to 9 millimetres in diameter; calyx sessile, with a broad shallow cavity and erect and incurved lobes mostly persistent on the ripe fruit; flesh thin, yellow, dry and mealy; nutlets three, thin, acute at the ends, slightly and irregularly ridged on the back, with a low grooved ridge, from 6 to 7 millimetres in length.

A tree, sometimes 8 metres in height, with a trunk often 3 decimetres in diameter, covered with smooth pale bark, stout wide-spreading branches forming a broad round-topped symmetrical head, and slender nearly straight branchlets marked by few small pale lenticels, dark yellow-green when they first appear, soon becoming light red-brown and lustrous, dark reddish brown the following year and ultimately ashy gray, and armed with slender nearly straight dark red-brown shining spines from 2 to 4.5 centimetres long. Flowers during the first week of May. Fruit ripens the middle of October.

Missouri: Webb City, *E. J. Palmer*, May and October, 1901, 1902; Carthage, *Canby and Sargent*, May, 1902; *E. J. Palmer*, June and October, 1902; common, usually in low rich soil.

In the neighborhood of Carthage, where *Cratægus Palmeri* is abundant, the leaves are more often acute at the apex than on trees at Webb City, and the fruit is less brightly colored and frequently greenish when fully ripe. This handsome tree of the Crus-galli Group, one of the largest and most symmetrical of American Thorns, is named for its discoverer, Mr. E. J. Palmer, of Webb City, who has carefully collected and studied Cratægus in southwestern Missouri, where the genus is represented by a large number of interesting forms, of which several are still undescribed.

C. S. S.

EXPLANATION OF THE PLATE.

Plate XXIX. Cratægus Palmeri.

1. Part of a flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit, enlarged.
6. Cross section of a fruit, enlarged.
7. A nutlet, rear view, enlarged.
8. A nutlet, side view, enlarged.

CRATÆGUS PALMERI, Sarg.

CRATÆGUS DALLASIANA, SARG.

CRATÆGUS DALLASIANA, *n. sp.*

Leaves obovate, acute, acuminate or rounded at the apex, gradually narrowed to the concave-cuneate entire base, coarsely and double serrate above, with straight glandular teeth, and usually slightly lobed above the middle; coated below with thick hoary tomentum and villose above as they unfold, and nearly fully grown and villose or tomentose below when the flowers open; at maturity thin but firm in texture, dark yellow-green, glabrous and lustrous on the upper surface, pale and pubescent on the lower surface along the slender midribs and three or four pairs of thin arching primary veins, from 4.5 to 6 centimetres long, from 3 to 4 centimetres wide; petioles slender, wing-margined toward the apex, grooved, coated early in the season with hoary tomentum, glabrous in the autumn, from 1 to 1.2 centimetres in length; stipules linear, often falcate, small, caducous. Flowers about 1.6 centimetres in diameter, in many-flowered densely villose thin-branched compound corymbs; bracts and bractlets linear to narrowly obovate, turning rose color before falling, caducous; calyx narrowly obconic, densely coated like the slender pedicels with long matted pale hairs, the lobes slender, acuminate, tipped with minute red glands, sparingly and irregularly glandular-serrate, villose, reflexed after anthesis; stamens twenty; anthers light rose color; styles five. Fruit on stout erect slightly villose pedicels, in few-fruited clusters, subglobose, dark dull red; 9 or 10 millimetres in diameter; calyx persistent, with a short tube, a broad deep cavity, and spreading and reflexed lobes bright red on the upper side at the base; nutlets five, acute at the narrowed ends, thin, rounded and grooved, with a broad shallow groove or irregularly ridged on the back, about 7 millimetres long.

A tree, usually about 7 metres in height, with a tall trunk from 1 to 1.5 decimetres in diameter, covered with pale bark, small erect branches forming an open irregular head, and slender somewhat zigzag branchlets marked by many small pale lenticels, thickly coated at first with thick hoary tomentum, reddish brown and lustrous before autumn, lighter colored the following season and ultimately ashy gray, and armed with straight slender gray spines from 3 to 4 centimetres in length. Flowers early in April. Fruit ripens at midsummer.

In forest-covered bottom-lands of the small tributaries of the Trinity River, Dallas County, Texas; not common; *J. Reverchon*, April and July, 1900, April, 1901.

Closely related to *Cratægus Brazoria*, Sargent, of the Collina Group, and a native of the lower Brazos River, Texas, *Cratægus Dallasiana* differs from that species in the form and texture of the leaves, and in the dull red not canary-yellow early-ripening fruit, and in the color of the bark.

C. S. S.

EXPLANATION OF THE PLATE.

Plate XXX. Cratægus Dallasiana.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit showing the nutlets, enlarged.
6. A nutlet, side view, enlarged.
7. A nutlet, rear view, enlarged.

CRATÆGUS DALLASIANA, Sarg.

CRATÆGUS FASTOSA, SARG.

CRATÆGUS FASTOSA, *n. sp.*

Leaves broadly oval to ovate, rounded or acute at the apex, concave-cuneate or rounded at the base, coarsely doubly serrate above, with straight glandular teeth, and rarely on vigorous shoots slightly lobed, with broad acute lobes; as they unfold covered above with long pale hairs, and provided below with large tufts of snowy white tomentum in the axils of the principal veins; when the flowers open dark yellow-green and nearly glabrous above, and still tomentose in the axils of the veins below; at maturity subcoriaceous, glabrous, yellow-green and lustrous on the upper surface, pale yellow-green on the lower surface, from 4.5 to 6 centimetres long, from 3 to 5.5 centimetres wide, with prominent light yellow midribs deeply impressed on the upper side, and usually five pairs of thin primary veins; petioles slender, slightly wing-margined toward the apex, grooved, densely villose in the spring, becoming puberulous later in the season, from 1.2 to 1.8 centimetres in length; stipules linear to lunate, acute, villose, coarsely glandular-serrate, caducous. Flowers about 1.8 centimetres in diameter on slender pedicels, in compact many-flowered glabrous corymbs; bracts and bractlets oblong-obovate and acute to lanceolate, coarsely glandular-serrate, large and conspicuous, turning pink in fading, usually persistent until after the petals fall; calyx broadly obconic, the lobes abruptly narrowed at the base, slender, acuminate, coarsely glandular-serrate, glabrous on the outer, villose on the inner surface; stamens twenty; anthers pale yellow; styles five, surrounded at the base by a broad ring of pale tomentum. Fruit drooping on thin reddish pedicels, in few-fruited clusters, subglobose to short-oblong, dull orange-red marked by large pale dots, from 9 to 10 millimetres in diameter; calyx sessile, with a broad shallow cavity and spreading serrate lobes villose on the upper side, mostly deciduous from the ripe fruit; flesh thin, yellow-green, dry and mealy; nutlets five, thin, narrowed and acute at the ends, obscurely ridged on the back, with a broad low often grooved ridge, about 8 millimetres in length.

A tree, from 6 to 7 metres in height, with a short trunk from 2 to 3 decimetres in diameter, covered with dark brown or nearly black scaly bark, small ascending branches forming an irregular open head, and slender nearly straight branchlets dark orange-green tinged with red when they first appear, becoming before autumn light red-brown, very lustrous and marked by numerous small lenticels, and dull reddish brown the following year, and armed with many stout nearly straight bright chestnut-brown shining spines from 4 to 5 centimetres long. Flowers from the 20th to the 25th of April. Fruit ripens from the middle to the end of October.

Low woods near Fulton, Arkansas, in the valley of the Red River; not common; *B. F. Bush*, April 18 and October 17, 1901; *Canby and Sargent*, April 18 and 23, 1901.

This plant, which seems to be extremely rare, at least in the neighborhood of Fulton, can probably best be placed in the Collina Group, although it differs from the other species described in its glabrous corymbs, and from *Cratægus collina*, Chapman, the other species with twenty stamens and yellow anthers, in the shape and texture of the leaves, the size of the fruit, and in habit.

C. S. S.

EXPLANATION OF THE PLATE.

Plate XXXI. Cratægus fastosa.

1. Part of a flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, side view, enlarged.
7. A nutlet, rear view, enlarged.

CRATÆGUS FASTOSA, Sarg.

CRATÆGUS TRELEASEI, SARG.

CRATÆGUS TRELEASEI, *n. sp.*

Leaves ovate to oval, acute, concave-cuneate or rounded at the broad base, sharply doubly serrate above, with straight glandular teeth, and slightly divided into three or four pairs of narrow acuminate lateral lobes; unfolding with the opening of the flowers and then light yellow-green tinged with bronze color, lustrous and covered above with short shining caducous white hairs, and thickly coated below with hoary tomentum; at maturity membranaceous, light yellow-green and scabrate on the upper surface, paler and pubescent below, particularly along the slender yellow midribs and four or five pairs of thin primary veins extending obliquely to the points of the lobes, from 6 to 8 centimetres long, from 4 to 5 centimetres wide; petioles slender, more or less wing-margined at the apex, slightly grooved, villose early in the season, pubescent in the autumn, sparingly glandular, with minute dark glands, from 1 to 2 centimetres in length; stipules oblong, oblique, acuminate, glandular, caducous. Flowers 2.5 centimetres in diameter on short stout pedicels, covered like the broad calyx-tube with matted pale hairs, in three to ten-flowered compact thick-branched compound or rarely simple villose corymbs; bracts and bractlets oblong-obovate, acute, glandular, with minute bright red glands; calyx-lobes narrowed from the base with wide rounded sinuses between them, slender, acuminate, tipped with small red glands, glandular-serrate, with stipitate red glands, glabrous, mostly reflexed as the flowers open; stamens twenty; anthers pale yellow; styles four or five, usually five. Fruit on stout erect villose pedicels, in few-fruited clusters, subglobose or often broader than high, crimson, lustrous, marked by many large pale dots, pubescent at the ends, from 1.2 to 1.7 centimetres in diameter; calyx prominent, with a short villose tube, a broad deep cavity, and reflexed and appressed villose lobes often deciduous from the ripe fruit; flesh thick, light yellow, dry and mealy; nutlets four or five, thin, full and rounded at the apex, narrowed and acute at the base, grooved with a broad shallow groove, and sometimes irregularly ridged on the back, from 7 to 8 millimetres long and from 6 to 7 millimetres high.

A tree, 7 or 8 metres in height, with a tall trunk sometimes 1.5 decimetres in diameter, ascending branches forming a narrow open head, and thin nearly straight branchlets, light green tinged with red and thickly covered when they first appear with long lustrous white hairs, dull light reddish brown and puberulous at the end of their first season, and dark gray-brown the following year, and armed with stout straight or slightly curved dark purple shining spines, usually about 3 centimetres long, or unarmed. Flowers at the end of April or early in May. Fruit ripens toward the end of September and falls gradually.

Banks of small streams in rich moist soil from Doe Run to Bismarck, St. François County, southeastern Missouri, *Trelease and Sargent*, October 5, 1899; *Trelease*, October 30, 1901.

This interesting addition to the Mollis Group is named for Professor William Trelease, the director of the Missouri Botanical Garden, who has greatly facilitated the study of Cratægus in the region west of the Mississippi River.

C. S. S.

EXPLANATION OF THE PLATE.

Plate XXXII. Cratægus Treleasei.

1. Part of a flowering branch, natural size.
2. Vertical section of a flower.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit showing the nutlets, enlarged.
6. A nutlet, side view, enlarged.
7. A nutlet, rear view, enlarged.

CRATÆGUS TRELEASEI, Sarg.

CRATÆGUS SPECIOSA, SARG.

CRATÆGUS SPECIOSA, *n. sp.*

Leaves ovate, acute or acuminate, cordate, truncate or rarely rounded at the broad base, coarsely doubly serrate, with straight glandular teeth, and slightly divided into four or five pairs of small acuminate lateral lobes, tinged with red when they unfold and about one third grown when the flowers open, and then sparingly villose above and furnished below with persistent tufts of pale tomentum in the axils of the principal veins; at maturity thick and rigid in texture, dark yellow-green, glabrous and lustrous on the upper surface, pale on the lower surface, from 5.5 to 6 centimetres long, from 4 to 5.5 centimetres wide, with slender yellow midribs, and from five to seven pairs of thin primary veins arching obliquely to the points of the lobes; petioles stout, deeply grooved, slightly glandular, especially on vigorous shoots, often rose-colored in the autumn, from 1.4 to 2 centimetres in length; stipules oblong-obovate and acute to lanceolate, coarsely glandular-serrate, large, persistent like the much enlarged conspicuous inner bud-scales until after the flowers open. Flowers 2.5 centimetres in diameter on slender pedicels, in compact usually five to eight-flowered glabrous thick-branched compound corymbs; bracts and bractlets oblong, acute, frequently slightly falcate, glandular, conspicuous, persistent at least until May; calyx-tube broadly obconic, the lobes wide, acuminate, tipped with minute glands, coarsely glandular-serrate usually only above the middle; stamens twenty; anthers large, dark rose color; styles five, surrounded at the base by a broad ring of pale tomentum. Fruit in few-fruited drooping clusters, depressed-globose, full and rounded at the ends, obscurely five-angled, bright crimson, very lustrous, marked occasionally by large yellow-green blotches and by many small pale dots, about 2.2 centimetres broad and 1.9 centimetres high; calyx cavity 7 millimetres in diameter, the lobes only slightly enlarged, spreading and reflexed, mostly deciduous from the ripe fruit; flesh thin, acid, pale yellow; nutlets five, thin, acute at the ends, slightly grooved or irregularly ridged on the back, from 7 to 9 millimetres in length.

A shrub, with numerous stems from 2 to 3 metres in height, forming a broad open head, and stout nearly straight branchlets marked by small scattered pale lenticels, dark orange-green tinged with red when they first appear, bright red-brown and very lustrous during their first season and dull gray-brown the following year, and armed with numerous stout nearly straight purple shining spines from 2.5 to 5 centimetres long. Flowers during the last week of April. Fruit ripens and falls about the middle of September.

Dry hills, Prosperity Junction, near Webb City, Missouri; common; *B. F. Bush*, May 19, 1901; *E. J. Palmer*, September, 1901, April and July, 1902; *Trelease and Sargent*, October, 1901.

Cratægus speciosa, with its large flowers, large and brilliant fruits, and lustrous leaves, is a showy and beautiful plant and an interesting addition to the small Dilatata Group. It is most closely related to *Cratægus coccinioides*, Ashe, from which it differs in its longer and more slender pedicels, its larger flowers, smaller, early-ripening fruit with yellow not red flesh, in the much smaller calyx of the fruit with little enlarged spreading and appressed mostly deciduous lobes, smaller and more lustrous leaves, and in its shrubby habit.

C. S. S.

EXPLANATION OF THE PLATE.

Plate XXXIII. Cratægus speciosa.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit, enlarged.
6. Cross section of a fruit, enlarged.
7. A nutlet, rear view, enlarged.
8. A nutlet, side view, enlarged.

CRATÆGUS SPECIOSA, Sarg.

CRATÆGUS SMITHII, SARG.

CRATÆGUS SMITHII, *n. sp.*

Leaves obovate, rounded or acute at the apex, gradually narrowed from near the middle to the concave-cuneate entire glandular base, finely and doubly serrate above, with straight gland-tipped teeth, and occasionally divided into short terminal lobes; nearly fully grown when the flowers open and then membranaceous, slightly viscid, bright yellow-green and roughened above by short white hairs, paler, and villose below along the slender midribs and usually three pairs of thin primary veins extending to the apex of the leaf; at maturity subcoriaceous, very dark yellow-green, lustrous and scabrate on the upper surface, pale and still slightly hairy below, from 2.3 to 3 centimetres long, from 1.2 to 2.2 centimetres wide; petioles short, wing-margined nearly to the base, villose early in the season, pubescent in the autumn, from 4 to 5 millimetres long; stipules oblong and acuminate to lanceolate, glandular, turning brown in fading, caducous. Flowers solitary on short stout villose pedicels; bractlets linear to oblong, glandular, caducous; calyx-tube narrowly obconic, villose, the lobes foliaceous, broad-ovate, acuminate, conspicuously serrate, with slender teeth tipped with minute red glands, reflexed when the flowers open; stamens twenty; anthers pale yellow; styles five or rarely six. Fruit erect on short stout slightly hairy pedicels, short-oblong, full and rounded at the ends, orange or orange-green, lustrous, about 1.5 centimetres long and 1.2 centimetres wide; calyx enlarged, sessile, with a broad deep cavity and reflexed and closely appressed lobes; flesh thin, green and hard; nutlets five, rarely six, thick, gradually narrowed to the acute ends, irregularly ridged and deeply grooved on the back, 7 millimetres in length.

A dichotomously branched straggling shrub, from 1 to 2 metres in height, with slender nearly straight branchlets, orange-brown and coated when they appear with long pale matted hairs, dull reddish brown and pubescent at the end of their first season and dark gray-brown the following year, and armed with very slender straight dark purple spines, ashy gray and long persistent on the old stems, from 1.5 to 3 centimetres in length. Flowers about the 20th of May. Fruit ripens from the middle to the end of September.

Open hillsides along Lownes Run, Springfield, Delaware County, Pennsylvania, *George Smith*, May, 1867; *B. H. Smith*, May, 1902; *B. H. Smith, W. M. Canby*, and *C. S. Sargent*, September, 1902.

This interesting addition to the Uniflora Group may be distinguished from *Cratægus uniflora*, Moench, which grows near it and flowers from a week to ten days later, by the slender straight teeth of the leaves, the solitary flowers and much broader and shorter calyx-lobes, and the larger fruit. *Cratægus Smithii* in its name may help to perpetuate that of Dr. George Smith, one of the founders in 1833 of the Delaware Institute of Science, over which he presided for nearly half a century, an active promoter of the study of the natural sciences, and the author of *The History of Delaware County, Pennsylvania*, containing a notice of the geology of the county, and catalogues of its minerals, plants, quadrupeds, and birds. First collected by Dr. Smith in 1867, the specimen of *Cratægus Smithii* preserved in his herbarium led to its rediscovery more than thirty years later by his son, Mr. B. H. Smith, who continues enthusiastically and successfully the study of the flora of Delaware County.

C. S. S.

EXPLANATION OF THE PLATE.

Plate XXXIV. Cratægus Smithii.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. A nutlet, side view, enlarged.
6. A nutlet, rear view, enlarged.

CRATÆGUS SMITHII, Sarg.

CRATÆGUS MICRACANTHA, SARG.

CRATÆGUS MICRACANTHA, *n. sp.*

Leaves oblong-obovate to oval, acute, acuminate or rarely rounded at the apex, gradually or abruptly narrowed from above or below the middle to the cuneate entire base, coarsely crenulate-serrate and occasionally three-lobed above, the short lateral lobes broad and acute; when they unfold villose on the upper surface and coated below with thick hoary tomentum, and more than half grown when the flowers open and then membranaceous and slightly villose above, with short scattered pale hairs; at maturity thin but firm in texture, dark yellow-green, lustrous and smooth above, paler and villose or tomentose below along the slender midribs and three or four pairs of very obscure primary veins, from 5 to 6 centimetres long, from 2.5 to 3 centimetres wide; petioles slender, more or less wing-margined toward the apex by the decurrent base of the leaf-blades, tomentose early in the season, glabrous or pubescent in the autumn, from 1.5 to 2.5 centimetres in length; stipules linear, acuminate, elongated, caducous; on leading shoots leaves often broadly rhombic to obovate, acuminate, frequently deeply three-lobed or divided into two or three pairs of short lateral lobes, usually from 6 to 7 centimetres long. Flowers 6 millimetres in diameter on long slender pedicels, thickly coated with matted white hairs like the thin branches of the broad lax many-flowered compound corymbs; bracts and bractlets linear, elongated, turning brown in fading, mostly deciduous before the flowers open; calyx-tube narrowly obconic, villose, the lobes linear, acuminate, entire, slightly villose, tipped with minute dark glands, reflexed after anthesis; stamens usually ten, occasionally twelve, fifteen, or twenty; anthers very small, deep bright red; styles five. Fruit on slender pubescent pedicels, in drooping many-fruited clusters, subglobose to short-oblong, full and rounded at the ends, bright orange-red, lustrous, marked by occasional large pale dots, about 7 millimetres long; calyx prominent with a short villose tube and spreading erect hairy lobes often deciduous from the ripe fruit; flesh thin, yellow, dry and mealy; nutlets five, thin, acute at the narrowed ends, rounded and sometimes slightly grooved on the back, about 6 millimetres in length.

An unarmed tree, sometimes 8 metres in height, with a tall trunk from 3 to 4 decimetres in diameter, covered with light or dark brown bark separating freely into thin narrow scales which in falling disclose the light yellow-brown inner bark, stout spreading branches forming a broad flat-topped handsome head, and slender nearly straight branchlets coated until after the flowering time with thick white tomentum, bright red-brown marked by many large pale lenticels and puberulous at the end of their first season, becoming light or dark dull reddish brown the following year. Flowers at the end of April or early in May. Fruit ripens the middle of October.

Low woods in rich moist soil near Fulton, Arkansas, in the valley of the Red River; common; *B. F. Bush*, May 13, 1900, April and October, 1901, April, 1902; *Canby and Sargent*, April, 1901.

This species of the Viridis Group is distinct in the hairy tomentum which covers the young leaves, branches, and corymbs early in the season, in the small flowers, which are smaller than those of any other American species now known, the generally small number of stamens, and red anthers. The other species of this group are usually glabrous, with twenty stamens and light yellow anthers. *Cratægus micracantha* is one of the most interesting of the numerous Thorns discovered by Mr. Bush in southern Arkansas and Texas.

C. S. S.

EXPLANATION OF THE PLATE.

Plate XXXV. Cratægus micracantha.

1. Part of a flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit, enlarged.
6. Cross section of a fruit, enlarged.
7. A nutlet, side view, enlarged.
8. A nutlet, rear view, enlarged.

CRATÆGUS MICRACANTHA, Sarg.

MALUS SARGENTI, REHD.

MALUS SARGENTI, *n. sp.*

Leaves slender-petiolate, ovate to elliptic or ovate-oblong, from 5 to 8 centimetres long, from 3 to 6 centimetres broad, acute or shortly acuminate, rounded or subcordate, rarely cuneate at the base, sharply and unequally serrate, with acuminate slightly spreading teeth; on flowering branches and short branchlets undivided and usually oval to ovate-oblong, on vigorous branches at least on the upper part ovate and three-lobed, and then usually subcordate at the base and shorter-petiolate, the middle lobe much larger than the others, broadest about the middle, often incised-serrate and even slightly lobed; covered as they unfold with white villose tomentum, soon disappearing from the upper surface; at maturity dark green and glabrous above, except on the impressed veins, pale green beneath and sparingly villose, particularly on the veins, the undivided leaves often nearly glabrous; petioles slender, from 1 to 2.5 centimetres long, pubescent; stipules, at least those of the upper part of the branches, leafy and persistent, ovate-lanceolate to lanceolate, often sparingly dentate. Flowers 2.5 centimetres in diameter, in broad five or six-flowered fascicles; pedicels slender, from 2.5 to 3 centimetres long, glabrous, upright or spreading; calyx-lobes like the calyx-tube glabrous on the outer surface, villose on the inner surface, ovate-lanceolate, acuminate, scarcely half as long as the petals; calyx deciduous before the maturity of the fruit; petals oval, from 1.2 to 1.5 centimetres long, overlapping, rounded at the apex, subcordate at the base and contracted into a short claw, pure white, glabrous; stamens fifteen to twenty, about half as long as the petals, with oval yellow anthers; styles usually four, sometimes five, rarely three, connate and villose below the middle; ovary four to five, rarely three-celled. Pome subglobose, about 1 centimetre in diameter, marked at the apex by the scar of the deciduous calyx, red, becoming soft and somewhat translucent when fully ripe; seeds obovate, about 4 millimetres long, light brown.

A low intricately branched shrub, about 1 or 1.5 metres high, with spreading rather rigid branches covered with smooth brown bark, and short often spinescent pubescent branchlets. Flowers appearing in May with the leaves. Fruit ripening at the end of September.

Japan: Hokkaido, brackish marsh near Mororan, September 25, 1892, *C. S. Sargent.*

Malus Sargenti is most nearly related to *Malus Toringo*, Siebold, differing from it chiefly in its larger pure white flowers, with broad subcordate petals overlapping each other, and in the larger fruits. From *Pyrus* (*Malus*) *Zumi*, Matsumura, which is also closely related to *Malus Toringo*, *Malus Sargenti* may be distinguished by the broader often lobed leaves, the shape of the petals, the glabrous calyx-tube, and the habit.

This handsome shrub was discovered by Professor Sargent during his travels in Japan, and was introduced by him into cultivation. Though naturally growing in marshy land, it thrives in drier localities at the Arnold Arboretum, where it has proved perfectly hardy and bears each year a profusion of pure white flowers, followed in autumn by attractive bright red fruits.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE XXXVI. MALUS SARGENTI.

1. A flowering branch, natural size.
2. Vertical section of a flower with the petals removed, enlarged.
3. A petal, enlarged.
4. A stamen, enlarged.
5. Cross section of an ovary, enlarged.
6. A fruiting branch, natural size.
7. Vertical section of a fruit, enlarged.
8. A fruit, divided transversely, enlarged.
9. A seed, enlarged.

MALUS SARGENTI, Rehd.

ERIOLOBUS TSCHONOSKII, REHD.

ERIOLOBUS TSCHONOSKII, *n. comb.*

PYRUS TSCHONOSKII, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xix. 169 (1874); *Mél. Biol.* ix. 165. — Franchet & Savatier, *Enum. Pl. Jap.* ii. 349.

Leaves slender-petiolate, elliptic-ovate, from 7 to 12 centimetres long, acuminate, rounded or subcordate at the crenately serrate base, irregularly dentate-serrate, or oftener doubly serrate and even slightly lobed; when they unfold clothed with a floccose whitish tomentum on both sides, soon becoming glabrous on the upper surface, and dark yellowish green at maturity, floccose or villose-tomentose beneath, with six to ten pairs of lateral straight veins extending to the points of the teeth; petioles slender, subterete, from 2 to 3 centimetres long, floccose-tomentose when young, usually ultimately glabrous; stipules linear-lanceolate, about 1 centimetre in length, paleaceous, reddish brown, caducous. Flowers about 3 centimetres in diameter in two to four-flowered umbel-like racemes at the end of short branchlets, all or the lower flowers in the axils of foliage leaves; pedicels tomentose, from 2 to 2.5 centimetres long, furnished below the middle with two linear paleaceous caducous bracts from 8 to 10 millimetres in length; calyx-tube densely villose-tomentose; calyx-lobes triangular-ovate, 5 millimetres long, densely tomentose within, less tomentose without; petals white, elliptic-oblong, about 15 millimetres long and 8 millimetres broad, concave, obtuse at the apex, abruptly contracted at the base into short claws; stamens forty to fifty, the longest more than half as long as the petals; anthers ovate, yellow; styles five, not longer than the stamens, villose below the middle and connate for about one third of their length; ovary inferior, five-celled, the cells two-ovuled; carpels free at their ventral suture, leaving a central opening. Pome globose, about 3 centimetres in diameter, on a stout spreading or nodding pedicel, yellowish green with purple cheek, marked by numerous pale dots, crowned by the persistent connivent calyx-lobes; flesh firm, astringent, interspersed with small colonies of grit-cells, core portion free at the firm conical apex; seeds obovate, compressed, brown, about 8 millimetres long and 5 millimetres broad.

A large tree. Cultivated trees in the Arnold Arboretum ten years old are of narrow pyramidal habit with ascending or upright branches and spreading branchlets, sometimes spinescent on the older parts of the tree; young branchlets tomentose, becoming glabrous in the second year; bark of young branches dull brown, or dark gray on older branches, remaining smooth and marked by horizontal lenticels. Flowers appear about the middle of May shortly after the foliage. Fruit ripens the beginning of October and drops soon after maturity and at the time the leaves turn scarlet and orange.

Japan: Mountains of Central Hondo; foot of Fusi-san, *Tschonoski* (single fruits and leaves only, in herb. St. Petersburg !); Usui-toge near Kamisawa, *C. S. Sargent* (1892) (fruits only).

Eriolobus Tschonoskii appears to be a rare tree and to be confined to the central mountains of Hondo, where it probably grows only with scattered individuals. For a long time this interesting species was known only from a few single leaves and fruits picked up by Tschonoski from the ground, but the seeds collected by Professor Sargent in 1892 produced plants at the Arnold Arboretum which flowered two years ago and made it possible to ascertain the true characters of the species. Maximowicz, judging by the shape of the fruit, had referred it to Malus, but an examination of the flowers and of the fresh fruit shows that they resemble closely those of the section Cormus, which, however, differs in its compound inflorescence, except in the species referred by Decaisne[1] and Koehne[2] to Cormus as *Cormus trilobata*,

[1] *Nouv. Arch. Mus.* x. 157 (*Mém. Fam. Pomac.*). [2] *Gatt. Pomac.* 24.

which has a simple umbel-like raceme, and to this species *Pyrus Tschonoskii* is most closely related. As the inflorescence in Pomaceæ presents apparently constant and reliable characters, it seems desirable to separate the racemose *Cormus trilobata* from the other species and to place it with *Pyrus Tschonoskii* in the genus Eriolobus, Roemer (Pyrus, sect. Eriolobus, Seringe).

In regard to the position of this genus it may be observed that it differs from most Sorbeæ in its simple inflorescence, and of the genera with simple inflorescences it is closely related only to Docynia and Malus, while with Peraphyllum, Amelanchier, Chænomeles, Cydonia, and Pyrus it has little affinity. The chief character by which it differs from Malus is in the grit-cells of the fruit, while from Docynia it can be separated only by the number of the ovules. As the absence or presence of grit-cells seems to be a rather important character, and in this case is supported by other minor differences and by the general habit of the plant, a union of Eriolobus with Malus would hardly be natural, but Docynia is so similar in all its characters and in its general habit, that a separation by the three-ovuled carpels would appear rather artificial, as the number of ovules is not quite constant, and sometimes more than two ovules are found in some species of Malus and occasionally in other genera of Pomaceæ.[1] Docynia, therefore, will best be merged into Eriolobus, which, as thus enlarged, is apparently a natural genus, the species being very similar in their general habit and in the structure of their flowers and fruits.

The characters of the genus Eriolobus[2] as here proposed are as follows: Flowers in few-flowered umbel-like racemes, white; stamens numerous, with yellow anthers; styles five, united through their lower third; ovary distinctly inferior, five-celled, union of the carpels centripetalous, complete except at the free ventral suture, leaving a central space (or union complete without central space? according to Decaisne in his Docynia[3]). Pome rather large, with upright persistent calyx; flesh with grit-cells; the core portion free at the apex and attenuated into a firm conical point. Leaves conduplicate in the bud, doubly serrate or incisely lobed, glabrous or floccose-tomentose, deciduous.

In cultivation *Eriolobus Tschonoskii* grows into a handsome tree of narrow pyramidal habit, especially beautiful in autumn, when the foliage assumes brilliant orange and scarlet tints. It has proved perfectly hardy in the Arnold Arboretum, but has flowered and fruited hitherto only sparingly.

Alfred Rehder.

Arnold Arboretum.

[1] Koehne, *Gatt. Pomac.* 25, 29.

[2] *Eriolobus*, Roemer, *Syn. Mon. Rosifl.* 216 (1847).
Pyrus, § *Eriolobus*, Seringe, *De Candolle Prodr.* ii. 636 (1825).
Cormus, § *Eriolobus*, Decaisne, *Nouv. Arch. Mus.* x. 157 (*Mém. Fam. Pomac.*) (1874). — Koehne, *l. c.* 24.
Docynia, Decaisne, *l. c.* 131 (1874). — Hooker, *Fl. Brit. Ind.* ii. 369. — Fritsch, *Engler & Prantl Pflanzenfam.* Teil iii. Abt. iii. 22. — Koehne, *l. c.* 24.

The genus as thus extended comprises four species, *Eriolobus trilobata*, Roemer, *l. c.* (*Cratægus trilobata*, Labillardière, *Icon. Pl. Syr.* iv. 15, t. 10 (1812). — *Eriolobus Tschonoskii*, Rehder. — *Eriolobus Indica* (*Pyrus Indica*, Wallich, *Pl. As. Rar.* ii. 56, t. 173 (1831); *Docynia Indica*, Decaisne, *l. c.*). — *Eriolobus Hookeriana* (*Docynia Hookeriana*, Decaisne, *l. c.* t. 15), all Asiatic and native to Japan, the Himalayas, and Asia Minor.

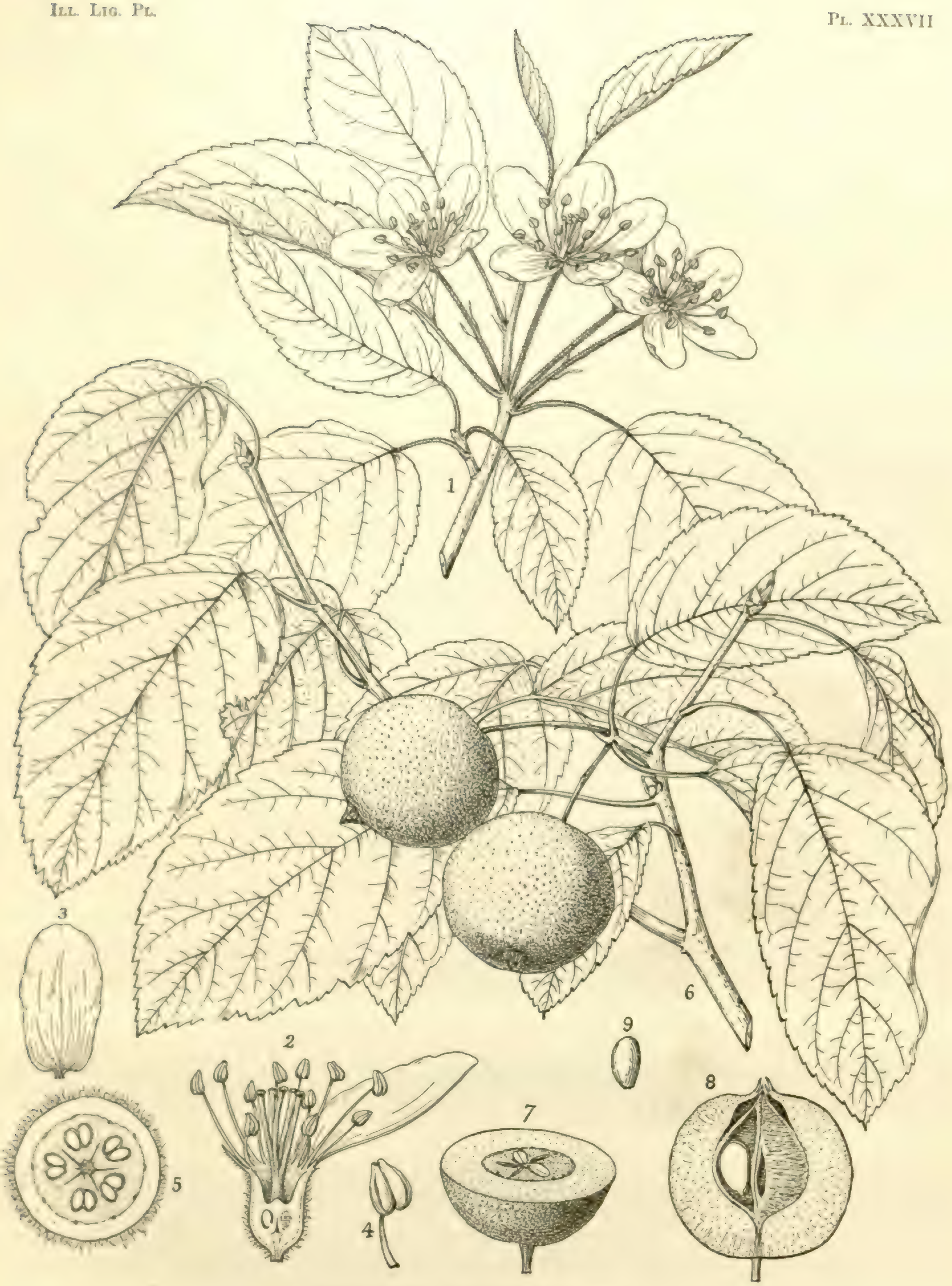
The description given by Franchet and Savatier of their *Pyrus Tschonoskii*, var. *Hoggii* (*Enum. Pl. Jap.* ii. 349), is so incomplete that it is impossible to decide whether this form belongs in Eriolobus. It may be the same Pyrus which was collected afterwards in Hondo near Nikko by Professor Sargent and figured as *Pyrus Tschonoskii* (*Garden & Forest*, vii. 54, f. 9). This, however, is a true Pyrus, and probably an undescribed species indigenous to Japan.

[3] Decaisne, *l. c.* t. 8, f. 3.

EXPLANATION OF THE PLATE.

Plate XXXVII. Eriolobus Tschonoskii.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A petal, enlarged.
4. A stamen, enlarged.
5. Cross section of an ovary, enlarged.
6. A fruiting branch, natural size.
7. Cross section of a fruit, natural size.
8. Vertical section of a fruit, natural size.
9. A seed, natural size.



ERIOLOBUS TSCHONOSKII, Rehd.

RIBES FASCICULATUM, SIEB. & ZUCC.

RIBES FASCICULATUM, Siebold & Zuccarini, *Abh. Akad. Münch.* iv. pt. ii. 189 (1845). — Miquel, *Ann. Mus. Lugd. Bat.* iii. 100; *Prol. Fl. Jap.* 264. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xix. 264; *Mél. Biol.* ix. 237. — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 279. — *Koehne, Deutsche Dendr.* 195. — Dippel, *Handb. Laubholzk.* iii. 302, f. 164. — Palibin, *Act. Hort. Petrop.* xvii. 91 (*Consp. Fl. Kor.*).

Leaves long-petiolate, alternate or fascicled, orbicular-ovate, three or rarely five-lobed, from 3 to 8 centimetres long, and about as broad, truncate or subcordate at the base; lobes ovate, acutish, incisely and coarsely serrate, serratures few, broad with convex margins, acutish; leaves dark green and glabrous on the upper side, pale green and glabrous beneath or puberulous on the veins when young, chartaceous at maturity; petioles from 1 to 2 centimetres long, puberulous above, dilated at the base, with several subulate ciliate appendages on each side. Flowers imperfectly diœcious, five-merous, glabrous, yellowish or greenish white, in few-flowered fascicle-like racemes appearing from lateral buds on branchlets of the previous year, together with fascicles of leaves, less often at the base of young branchlets; staminate flowers about 8 millimetres in diameter, in fascicles of three to five; pedicels slender, from 4 to 6 millimetres long, articulate about the middle, in the axils of short ovate bracts; calyx cupulate, with five spreading at last reflexed lobes, oval, 3 millimetres long; petals suborbicular, about one third as long as the sepals; stamens scarcely exceeding the petals, with the filaments shorter than the orbicular yellow anthers; style and ovary rudimentary; pistillate flowers in one to three-flowered fascicles, with shorter pedicels, a more campanulate calyx-tube, somewhat shorter sepals and rudimentary stamens; style shorter than the calyx-tube, with a two-lobed stigma; ovary ovoid, glabrous. Fruit a globose scarlet berry crowned by the persistent calyx-tube, about 1 centimetre in diameter, many-seeded; pedicels about as long as the fruit; seeds ovoid, about 4 millimetres long, sharply and irregularly three-angled, light pinkish brown.

An upright unarmed shrub, from 1 to 1.5 metres high, with short spreading branches, the younger covered with light yellowish gray shredding bark, the older with dark reddish brown flaky bark. Flowers appearing in May, followed at the end of September or at the beginning of October by scarlet berries of a sweetish but mawkish flavor. In Japan, according to Maximowicz, this shrub flowers in March and fruits in July.

Japan: Hondo, Nikko Mountains, *Tschonoski*, 1864; Tokio, *Miyabe;* Yokohama, *Maximowicz*, 1862; Shikoku, Nanokawa, *K. Watanabe*, March 29, 1890.

Ribes fasciculatum, which in its typical form is nearly or quite glabrous, is sometimes pubescent on the under surface of the leaves and on the petioles and young branchlets. This pubescent form, which has been described as var. *Chinense*,[1] occurs in northern China and Korea.

Both forms, the type and the pubescent variety, are in cultivation at the Arnold Arboretum, where they have proved perfectly hardy. The type was received in 1884 from the nursery of the S. B. Parsons Company, at Flushing, New York, under the name of *Ribes Japonicum;* the Chinese variety was introduced by Professor Sargent, who gathered ripe fruits in 1892 from plants cultivated in the Botanic Garden at Tokio. In the Arnold Arboretum the type is

[1] *Ribes fasciculatum*, var. *Chinense*, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xix. 264; *Mél. Biol.* ix. 237 (1874). — Moore, *Jour. Bot.* xii. 138. — Ito, *Tokio Bot. Mag.* xiv. 105.

Ribes Chifuense, Hance, *Jour. Bot.* xiii. 36 (1875).

represented by staminate, the variety by pistillate plants. The bright scarlet fruits, which remain on the branches for a long time and do not begin to shrivel until the middle or end of November, make *Ribes fasciculatum* very attractive in the autumn, and a valuable addition to the shrubs with late-hanging ornamental fruits.[1] The leaves, too, do not fall until the beginning of the winter.

ALFRED REHDER.

Arnold Arboretum.

[1] Rehder, *Möller's Deutsche Gärtn.-Zeit.* xiv. 571 fig. (1899).

EXPLANATION OF THE PLATE.

PLATE XXXVIII. RIBES FASCICULATUM.

1. A branch with staminate flowers, natural size.
2. Vertical section of a staminate flower, enlarged.
3. Vertical section of a pistillate flower (var. *Chinense*), enlarged.
4. A sepal, enlarged.
5. A petal, enlarged.
6. A stamen, enlarged.
7. A fruiting branch (var. *Chinense*), natural size.
8. A seed (var. *Chinense*), enlarged.
9. A seed (var. *Chinense*), divided transversely, enlarged.

RIBES FASCICULATUM, Sieb. & Zucc.

CORNUS PURPUSI, KOEHNE.

CORNUS PURPUSI, Koehne, *Gartenflora*, xlviii. 338 (1899).

Leaves petiolate, elliptic-ovate to oblong, gradually or abruptly acuminate at the apex, cuneate or occasionally rounded at the base, on the upper side appressed-pubescent when unfolding, soon glabrous and dark green, on the under side glaucous (under the microscope covered with minute papillæ connected by ridges and folds of the epidermis), and sparingly appressed-pubescent on the five or six pairs of veins with whitish gray or fulvous appressed hairs, from 5 to 8 centimetres long, and from 2 to 4 centimetres broad; petioles slender, from 1 to 1.5 centimetres long, pubescent or sometimes nearly glabrous. Cymes dense, umbel-like, from 4 to 5 centimetres in diameter, with grayish or fulvous slightly appressed villose pubescence; peduncles from 3 to 5 centimetres long, pubescent. Flowers about 8 millimetres across, almost sessile or occasionally on pedicels as long or rarely longer than the ovary; calyx-teeth pubescent, ovate to subulate, one half or nearly as long as the densely appressed-pubescent ovary; petals oblong, acute; stamens slightly longer than the petals; style abruptly swollen below the stigma. Drupe subglobose, from 5 to 6 millimetres in diameter, dark blue or whitish and partly flushed with blue; stone irregularly subglobose, oblique, from 3.5 to 4 millimetres high, usually broader than high, irregularly and obtusely ridged.

A shrub, with spreading stems, spreading often arching branches, forming a loosely branched roundish bush, usually broader than high, and branchlets densely appressed-pubescent while young, becoming ultimately yellowish red or purple, in their second year slightly pubescent or glabrous, and finally changing toward the base of old stems to a dull gray. Flowers appear in July, or toward the southern limits of its range in May or June. Fruits ripen in September.

Northeastern North America from Quebec westward to Alberta, Minnesota, Nebraska, and Kansas, and southward to Missouri, Illinois, and Pennsylvania. Canada: Quebec, *J. G. Jack;* Alberta, *William M. Canby;* Maine, *J. C. Parlin;* New Hampshire, *M. L. Fernald;* Vermont, *C. G. Pringle, M. A. Day, A. Rehder;* Massachusetts, *L. L. Dame, A. Rehder;* Connecticut, *A. L. Winton;* New York, *A. Gray, A. Rehder;* Pennsylvania, *T. C. Porter;* Michigan, *E. J. Cole;* Wisconsin, *Mrs. Luce, J. G. Jack,* and *A. B. Seymour;* Ohio, *C. A. Purpus* (plants raised from seed collected near Toledo in the Botanic Garden, Darmstadt, Germany; type!); Illinois, *V. H. Chase;* Iowa, *R. Burgess, C. R. Ball;* Missouri, *B. F. Bush;* Kansas, *J. B. Norton;* Nebraska, *F. Clements.*

Cornus Purpusi is related to *Cornus Amomum*, Miller, and has been confounded until recently with that species. It differs from *Cornus Amomum* chiefly in the glaucous or glaucescent under side of the narrower leaves, which is densely covered by minute papillæ, while in *Cornus Amomum* the under side of the generally much broader leaves, which are usually rounded at the base, is pale or yellowish green, with a smooth epidermis. *Cornus Purpusi* has lighter colored yellowish red to purple branches; the pubescence of the inflorescence is more appressed; the inflorescence and the flowers are smaller, the pubescence on the under side of the veins of the leaves is less rusty, and sometimes is grayish white; the fruit is often pale, sometimes almost white, and the stone is less strongly ribbed. The whole appearance of the shrub with its looser habit and more or less pendulous leaves is quite distinct from the more compact *Cornus Amomum*. The geographical range of *Cornus Purpusi* is much wider than that of *Cornus Amomum*, which is restricted to the middle Atlantic States, ranging from Massachusetts southward to Georgia, and west to New York, Pennsylvania, and eastern Tennessee.

Cornus Purpusi has been cultivated for a long time in the Arnold Arboretum under the name of *Cornus Amomum* with the typical form of that species. Judging from a figure of *Cornus stolonifera* in the *Revue Horticole*,[1] which clearly represents *Cornus Purpusi*, it was introduced into European gardens many years ago.

ALFRED REHDER.

Arnold Arboretum.

[1] André, *Rev. Hort.* 1888, p. 444.

EXPLANATION OF THE PLATE.

PLATE XXXIX. CORNUS PURPUSI.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A stigma, enlarged.
4. A fruiting branch, natural size.
5. A stone, enlarged.

CORNUS PURPUSI, Koehne

CORNUS ARNOLDIANA, REHD.

(Cornus candidissima × Purpusi.)

CORNUS ARNOLDIANA, *hybr. nov.*

Leaves petiolate, elliptic to elliptic-ovate, acuminate or abrupt acuminate, narrowed at the base, above dark green and sparingly appressed-pubescent when young, glabrous at maturity, glaucous and sparingly appressed-pubescent on the lower surface, from 4 to 7 centimetres long, from 2 to 3 centimetres broad, with three to five pairs of primary veins. Flowers about 8 millimetres in diameter, in dense hemispherical and panicle-like cymes, from 4 to 5 centimetres across, sparingly appressed-pubescent; calyx-teeth short, triangular-ovate, scarcely half as long as the appressed-pubescent ovary; petals oblong, acute; stamens about as long as the petals; disk red; style usually more or less swollen below the stigma. Drupe subglobose, about 6 millimetres in diameter, white or flushed with blue; stone irregularly subglobose, depressed, about 3.5 millimetres high and 4 millimetres broad, marked by about six vertical lines and but slightly ridged.

A round-topped shrub, from 2 to 3 metres in height, with erect stems and upright or spreading branches covered with light gray or light brownish gray smooth bark; young branchlets green or purplish, sparingly appressed-pubescent or nearly glabrous, becoming purple toward the end of the year. Flowers appear in June. Fruit ripens in August.

Several specimens of *Cornus Arnoldiana* have been found among the plants of *Cornus candidissima* planted along the drives in the Arnold Arboretum. As these shrubs were intermediate in all their characters between *Cornus candidissima*, Miller, and *Cornus Purpusi*, Koehne, and could be referred to neither of them, I came to the conclusion that they were in all probability hybrids of these two species; this opinion was confirmed by an examination of the pollen, which showed a large percentage of small and irregularly shaped empty grains, and also by the fact that the shrubs fruited but sparingly while the other plants of Cornus were loaded with fruits. From *Cornus candidissima* this hybrid is distinguished by the more spreading habit, the purple color of the one year old branches, the pubescence of the under side of the leaves and of the less elongated inflorescence, the claviform style, and the often bluish color of the fruits. From *Cornus Purpusi* it differs in its more upright habit, the grayish color of the older branches, the slightly pubescent young branches and inflorescence, the shorter calyx-teeth, the slightly bluish or white fruits, and the less ridged stone. The name *Cornus Arnoldiana* is given to this Cornus in honor of the founder of the Arnold Arboretum, and at the same time in allusion to the place where this hybrid was discovered. As the two parent species have a similar distribution and not unfrequently are found growing side by side, it is not improbable that it may be found in other places.

When it is in flower *Cornus Arnoldiana* is as beautiful as *Cornus candidissima*, but it lacks the abundance of fruits which makes the latter so conspicuous in autumn.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate XL. Cornus Arnoldiana.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A pistil, enlarged.
4. A fruiting branch, natural size.
5. A stone, enlarged.

CORNUS ARNOLDIANA, Rehd.

CORNUS BRACHYPODA, C. A. MEY.

CORNUS BRACHYPODA, C. A. Meyer, *Ann. Sci. Nat.* sér. 3, iv. 74 (1845). — Walpers, *Ann.* ii. 725. — Miquel, *Ann. Mus. Lugd. Bat.* ii. 160; *Prol. Fl. Jap.* 92. — K. Koch, *Dendr.* i. 684. — Franchet & Savatier, *Enum. Pl. Jap.* i. 195. — Usteri, *Zeitschr. Gartenb. u. Gartenk.* xiv. 290. — Koehne, *Gartenflora*, xlvi. 94. — Makino, *Tokio Bot. Mag.* xi. 378. — Diels, *Engler Bot. Jahrb.* xxix. 506 (*Flora von Central-China*).

CORNUS SANGUINEA, Thunberg, *Fl. Jap.* 62 (not Linnæus) (1784). — Siebold & Zuccarini, *Abh. Akad. Münch.* iv. ii. 194.[1]

CORNUS ALBA, Thunberg, *Fl. Jap.* 63 (not Linnæus) (1784).[1]

CORNUS THELYCANIS, Lebas, *Rev. Hort.* 1875, 394, f. 64.

CORNUS CRISPULA, Hance, *Jour. Bot.* x. 216 (1881).

CORNUS IGNORATA, Shirasawa,[2] *Ic. Ess. Forest Jap.* i. 121, t. 77 (not K. Koch) (1900).

Leaves petiolate, opposite, membranaceous, elliptic-ovate to elliptic-oblong, from 7 to 14 centimetres long, from 4 to 7 centimetres broad, rather abruptly acuminate, rounded or broadly cuneate at the base, often finely erose-denticulate on the margins, with six to eight pairs of veins, dark green above and sparingly appressed-pubescent when young, becoming glabrous at maturity, glaucous beneath and sparingly beset with appressed forked hairs; petioles slender, grooved, from 1.5 to 2.5 centimetres long, glabrous. Cyme panicle-like and rather loose, from 8 to 15 centimetres in diameter, ramifications sparingly appressed-pubescent toward the tips; peduncle from 4 to 5 centimetres long, glabrous; pedicels shorter than the appressed-pubescent ovary or those of the terminal flowers about as long; calyx-teeth very short, triangular; petals oblong, acutish, from 4 to 5 millimetres long, appressed-pubescent on the outer surface; stamens slightly longer than the petals; style abruptly swollen below the stigma into a short disk. Drupe globose, from 5 to 6 millimetres in diameter, bluish black; stone subglobose, nearly smooth, about 4 millimetres in diameter.

A small tree or large shrub; young branchlets obscurely quadrangular, glabrous or nearly so, becoming yellowish or reddish brown the second year; bark of the trunk smooth, light gray. Flowers appearing in August. Fruits ripening in September.

Japan: Hondo, without locality, *Siebold;* Hakone, *Tschonoski*, 1864; Road Atami to Odawara, *C. S. Sargent*, August 28, 1892; Shikoku, Nanokawa, *K. Watanabe;* Kiu-siu, Nagasaki, *Oldham*, 1862; China: Prov. Hupeh, *A. Henry* (Nos. 5506, 6300 A), *E. H. Wilson* (Nos. 984, 1152, 1935).

Cornus brachypoda has often been confounded with *Cornus macrophylla*, Wallich, which, however, is very different in its alternate leaves and pitted stones. It is more closely related to *Cornus corynostylis*, Koehne, which is chiefly distinguished by its claviform style and smaller inflorescence. The *Cornus Theleryana*, Hort., which was doubtfully referred to *Cornus corynostylis* by Koehne, who had seen no flowering specimens, belongs, according to a flowering specimen from the Kew Arboretum, to *Cornus brachypoda*. *Cornus Theleryana* is like *Cornus Thelycanis*, Lebas, a name in all probability corrupted from *Cornus Thelycrania*, Thelycrania, Endlicher, being a section of the genus, and a shrub which I saw under the name *Cornus Thelycrania* in the Jardin des Plantes at Paris also belonged to *Cornus brachypoda*.

[1] Of *Cornus alba*, Thunberg, *Cornus sanguinea*, Thunberg, and *Cornus glauca*, Blume (ined.), there are specimens received from the herbarium at Leyden in the Gray Herbarium, which all belong to *Cornus brachypoda*.

[2] The figures of the fruits of *Cornus macrophylla* and *Cornus ignorata* have been apparently interchanged, for it is *Cornus macrophylla* which has the stone with a pit at the apex.

Cornus brachypoda is one of the handsomest Cornels in cultivation, if we except the species of the section Benthamia, and one of the most vigorous growing. Unfortunately it does not seem perfectly hardy in central Europe, though I noticed a good-sized shrub of this species in bloom in Späth's nursery near Berlin two years ago; farther south, in the public parks at Zurich, a tree of about 8 metres height, with a slender stem 38 centimetres in circumference, has been shown to me by Mr. A. Usteri, who had discovered it there several years ago, and in his paper quoted above correctly identified it with the much misunderstood *Cornus brachypoda* of C. A. Meyer. Its hardiness in the extreme northern United States is therefore doubtful; in the middle Atlantic States, however, it will certainly be hardy and a valuable addition to the list of ornamental trees.

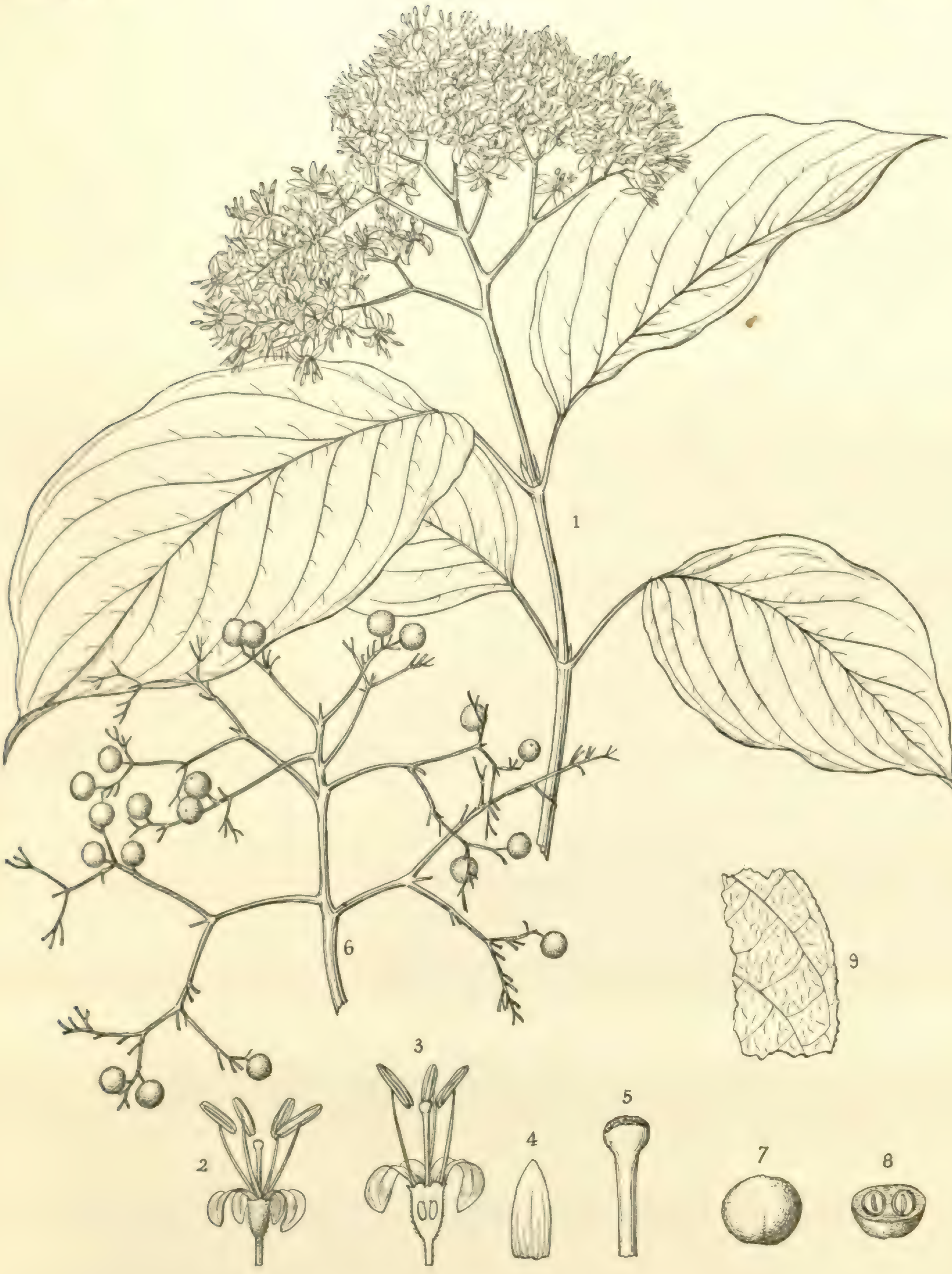
Alfred Rehder.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate XLI. Cornus brachypoda.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. Vertical section of a flower, enlarged.
4. A petal, enlarged.
5. A stigma, enlarged.
6. A fruiting cyme, natural size.
7. A stone, enlarged.
8. Cross section of a stone, enlarged.
9. Part of a leaf showing the under side with the forked hairs, enlarged.



CORNUS BRACHYPODA, C. A. Mey.

VIBURNUM SARGENTI, KOEHNE.

VIBURNUM SARGENTI, Koehne, *Gartenflora*, xlviii. 341 (1899).— Rehder, *Bailey Cycl. Am. Hort.* iv. 1927.

VIBURNUM OPULUS, Gray, *Mem. Am. Acad.* n. ser. vi. 393 (*On the Botany of Japan*) (not Linnæus) (1859).— Miquel, *Ann. Mus. Lugd. Bat.* ii. 265; *Prol. Fl. Jap.* 153.— Franchet & Savatier, *Enum. Pl. Jap.* i. 199.— Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 4; *Mél. Biol.* x. 670. — Baker & S. Moore, *Jour. Linn. Soc.* xvii. 383. — Franchet, *Nouv. Arch. Mus.* sér. 2, v. 148 (*Pl. David.* i.).— Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 354.

Leaves petiolate, orbicular-ovate to ovate, from 6 to 12 centimetres long, from 5 to 10 centimetres broad, usually three-lobed and palmately three-nerved, rounded or truncate at the base, the lobes acuminate, coarsely and irregularly dentate, the lateral spreading; leaves on the upper part of the branches often elongated, narrowly elliptic to oblong-lanceolate, not lobed, remotely and sinuately dentate, or three-lobed, with entire or nearly entire acuminate lobes, the lateral lobes short, the middle lobe elongated; upper surface of the leaves dark yellowish green and glabrous, under surface pale green, short-pilose all over or only on the veins; petioles rather stout, from 2 to 4 centimetres long, pilose or nearly glabrous, grooved above, with two small subulate stipules at the base and two to four rather large disks at the apex. Flowers in umbel-like rather dense many-flowered six to eight-rayed corymbs from 8 to 10 centimetres in diameter, with radiant neutral flowers; peduncle stout, from 2 to 5 centimetres in length, pilose or glabrous; pedicels very short, like the minute distinctly toothed calyx, glabrous or nearly so; corolla cupulate-rotate, five-lobed, with short rounded lobes, about as long as the tube, creamy white, nearly 5 millimetres in diameter; stamens five, at least one and one half times as long as the corolla; anthers purple; stigma two-lobed, sessile; neutral flowers white, slender-pedicelled, from 2 to 2.5 or rarely to 3 centimetres in diameter, deeply five-cleft, their lobes obovate and unequal. Fruit subglobose, orange-scarlet, about 8 millimetres in diameter; stone orbicular, flattened, 6 millimetres in diameter, grayish white, slightly rough; embryo flat.

An upright shrub, from 2 to 3 metres in height, with branchlets pilose when young or glabrous, becoming yellowish or reddish brown in their second year and marked by conspicuous lenticels; bark of the stems and older branches dark gray, corky, with shallow longitudinal fissures; winter-buds ovoid, stipitate, of the color of the branches, glabrous, often partly covered with gum, inclosed by two outer connate scales. Flowers in June. The fruit ripens about the middle of September.[1]

Northern China; mountains near Pekin, *Bretschneider* (seeds only): Mandshuria, Ussuri, *Maack;* ad. fl. Amur, *Maack*, 1855, coast of Mandshuria, *C. E. Wilford*, 1859: Davuria, *Sosnin:* Japan, Hokkaido, Hakodadi, *C. Wright*, 1853–59, Mororan, *C. S. Sargent*, September 24, 1892, Sapporo, *Y. Tokubuchi;* Hondo, shores of Lake Chuzenji, *C. S. Sargent*, September 3, 1892.

The lower surface of the leaves, the branchlets and inflorescence of *Viburnum Sargenti* vary from pilose to glabrous. The glabrous form appears to be the more common one, as of the specimens referred to only those collected by Wilford,

[1] *Viburnum pubinerve*, Blume in herb., is quoted by Miquel as a synonym of his *Viburnum Opulus*, and a specimen in the Gray Herbarium communicated from the herbarium at Leyden sustains this view, but according to Forbes & Hemsley (*Jour. Linn. Soc.* xxiii. 354) the specimen of *Viburnum pubinerve* in the Kew Herbarium belongs to *Viburnum phlebotrichum*, Siebold & Zuccarini.

by Maack on the Ussuri, and by Sargent in Hondo belong to the pilose form. The latter must be considered as the type, as Koehne described only this form, and even makes the pubescence one of the chief distinctive characters of his species. The principal difference between *Viburnum Sargenti* and the closely related *Viburnum Opulus*, Linnæus, is found in the corky bark, the larger neutral flowers, the purple anthers, and the smaller fruit. The bark of three or four year old branches is about 0.5 millimetres thick, and corky, while on the branches of *Viburnum Opulus* it is only 0.1 millimetre thick and the bark of older stems is smooth and light gray. *Viburnum Sargenti* differs also in the elongated upper leaves and in its more compact and upright habit.

Viburnum Sargenti was raised at the Arnold Arboretum in 1882 from seeds collected by Dr. Bretschneider on the mountains near Pekin, and was sent later to a few European gardens as "*Viburnum Opulus* from the mountains near Pekin." Both the pubescent and the glabrous forms were raised from this seed, although most of the plants were glabrous. As an ornamental plant *Viburnum Sargenti* differs from the American form of *Viburnum Opulus* by its more upright and compact habit, its larger ray-flowers and purple anthers. The fruits are less brilliant and, at least on the plants cultivated at the Arboretum, are smaller and less abundant than on *Viburnum Opulus*.

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EXPLANATION OF THE PLATE.

PLATE XLII. VIBURNUM SARGENTI.

1. A flowering branch, natural size.
2. A flower, the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. Cross section of a fruit, enlarged.
5. A seed, enlarged.
6. A branch with winter buds.

VIBURNUM SARGENTI, Koehne

VIBURNUM VENOSUM, BRITT.

VIBURNUM VENOSUM, Britton, *Man.* 871 (1901).

Leaves petiolate, orbicular to ovate, sometimes broadly obovate or oval, from 5 to 10 centimetres long, rounded or shortly acuminate at the apex, truncate or subcordate at the base, coarsely toothed, dark green, the upper surface furnished while young with scattered stellate hairs, glabrous at maturity, pale green and stellate-tomentose beneath, especially on the five to seven pairs of primary veins impressed above and very prominent beneath; petioles stout, from 1 to 2 centimetres long, stellate-tomentose, without stipules. Flowers in umbel-like six to seven-rayed stellate-tomentose cymes from 6 to 7 centimetres in diameter, on stout peduncles from 1 to 5 centimetres long; flowers nearly sessile, furnished at the base like the raylets with small caducous pubescent bracts; ovary ovoid-oblong, glabrous; calyx-teeth triangular-ovate, ciliate; corolla rotate, about 5 millimetres across, with five ovate rounded lobes longer than the tube; stamens about twice as long as the corolla, with oval yellow anthers; stigma sessile, three-lobed. Drupe globose-ovoid, about 7 millimetres in diameter, bluish black; stone globose-ovoid, yellowish white, convex and irregularly and indistinctly ridged on one side, grooved on the other.

An upright shrub, from 2 to 3 metres in height, with upright stems covered with grayish brown bark, upright or spreading branches forming a rather compact mass of roundish or broadly pyramidal outline, and branchlets furnished while young with stellate hairs, yellowish brown, and usually scabrous especially toward the apex in their second season; winter-buds ovate, pointed from 6 to 8 millimetres long, glabrous, with two pairs of imbricated slightly ciliate outer scales. Flowers appearing in June. Fruit ripens toward the end of September and falls soon after becoming fully ripe.

Massachusetts to New Jersey, along the coast; Nantucket (type locality), *Jackson Dawson*, September 19, 1888; Nantucket, Wanwinet, *M. A. Day*, June 5, 1900 (No. 34); Martha's Vineyard, *C. E. Bessey*, July 6, 1883.

Viburnum venosum is closely related to *Viburnum molle*, Michaux, differing chiefly from that species in its smaller leaves, more densely stellate-tomentose and very prominently veined beneath, by its smaller and denser cymes, and by the fact that it flowers and ripens its fruit from two to three weeks earlier.

Viburnum venosum has been in cultivation in the Arnold Arboretum since 1889, when it was raised from seed collected by Mr. Dawson on Nantucket. As a garden shrub it is as valuable as *Viburnum molle* and *Viburnum dentatum*.

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EXPLANATION OF THE PLATE.

Plate XLIII. Viburnum venosum.

1. A flowering branch, natural size.
2. A flower, the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A fruit divided transversely, enlarged.
5. A seed, enlarged.

VIBURNUM VENOSUM, Britt.

LONICERA MYRTILLUS, Hook. f. & Thoms.

Lonicera Myrtillus, Hooker f. & Thomson, *Jour. Linn. Soc.* ii. 168 (1858). — Brandis, *Forest Fl. Brit. Ind.* 255. — Buser, *Boissier Fl. Orient.* Suppl. 276. — Aitchison, *Jour. Linn. Soc.* xviii. 65. — Dippel, *Handb. Laubholzk.* i. 254, f. 166. — Koehne, *Deutsche Dendr.* 543.

Lonicera parvifolia, var. Myrtillus, Clarke, *Hooker Fl. Brit. Ind.* iii. 13 (1882).

Lonicera depressa, var. Myrtillus, Nicholson, *Hand-list Arb. Kew*, ii. 13 (1896).

Leaves short-petiolate, membranaceous, elliptic or elliptic-ovate to oblong, from 1 to 1.5 rarely to 2 centimetres long, obtuse, rounded or narrowed at the base, glabrous, dull green above, glaucescent beneath; petioles 1 to 2 millimetres long, glabrous. Flowers in short-peduncled pairs in the axils of the lower leaves; peduncles puberulous, about as long or sometimes longer than the petioles; bracts leafy, narrowly oblong, glabrous, exceeding the calyx; bractlets connate, with a truncate or slightly lobed cupule, about half as long as the connate ovaries; calyx cupulate, with five short triangular usually unequal teeth, glabrous; corolla cylindric-campanulate, yellowish white, glabrous without, about 1 centimetre long; tube with equal base, densely hairy within, especially near the mouth, about three times longer than the five-lobed spreading limb; lobes orbicular-ovate, obtuse; stamens inserted about the middle of the tube, with very short glabrous filaments; anthers not reaching the mouth; style glabrous, half as long as the tube, with a large capitate stigma; ovaries wholly or nearly connate, two-celled, the cells few-ovuled. Berries subglobose, about 6 millimetres in diameter, bright orange-red, glossy, crowned by the two persistent calyces; seeds few, ovoid, compressed, yellowish white, about 3 millimetres long, with a finely granulate testa.

A low much-branched shrub, from 0.5 to 1 metre in height, with slender upright or prostrate branches covered with light yellowish or grayish brown bark; young branchlets puberulous. Flowers appearing in May and June. Fruit ripens in July.

In the higher alpine regions of the Himalayan Mountains and Afghanistan, at altitudes of from 3000 to 4500 metres; Kashmir, Kishtwar, *T. Thomson*, without locality, *Jacquemont* (No. 2205); Punjab Himalaya, *Jaeschke;* Kumaon, *Strachey and Winterbottom;* Sikkim, *J. D. Hooker;* Afghanistan, *H. Collett*, Kuram Valley, *J. E. T. Aitchison* (No. 393).

Lonicera Myrtillus is not closely related to any other species with the exception of *Lonicera angustifolia*, Wallich, which, however, is easily distinguished from it by the larger acute or acuminate leaves, the slender drooping peduncles and the longer corolla-tube usually pubescent on the outside. The *Lonicera parvifolia* of Hooker f. & Thomson, which has been described as a closely allied species, can hardly be considered specifically distinct, as its distinguishing characters are slight and it is connected by intermediate forms with *Lonicera Myrtillus.* It is therefore referred as a variety to that species.[1]

[1] *Lonicera Myrtillus*, var. *depressa*, n. var.

Lonicera depressa, Royle, *Ill. Bot. Him.* 236 (1839), *nomen nudum.* — Nicholson, *Hand-list Kew Arb.* ii. 13.

Lonicera parvifolia, Hooker f. & Thomson, *Jour. Linn. Soc.* ii. 168 (1858) (not Hayne, nor Edgeworth). — Clarke, *Hooker Fl. Brit. Ind.* iii. 13.

This variety differs from the type in its larger and broader oval to oblong bracts and the longer peduncles sometimes almost as long as the leaf.

Himalayas: without locality, *Jacquemont* (No. 2237); Kumaon, *J. F. Duthie;* West Nepal, *J. F. Duthie;* Sikkim, *J. D. Hooker.*

The name *depressa* has been retained here for the *Lonicera parvifolia* of Hooker f. & Thomson, since it has been referred by most authors to this form, though Royle's type specimen in the Kew Herbarium, is of an intermediate character and might be

Lonicera Myrtillus was introduced into cultivation about twenty years ago and is growing at the Arnold Arboretum, where it has proved hardy with slight protection during the winter. It is a graceful little shrub, but the flowers are too small and, like the fruits, are not produced in sufficient numbers to make much ornamental effect.

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referred as well to one as to the other. *Lonicera parvifolia* of Hooker f. & Thomson cannot be used as a name for this form on account of two older homonyms, for the *Lonicera parvifolia*, Edgeworth, erroneously referred by Hooker & Thomson to this form, is identical with the later *Lonicera obovata*, Royle, as Edgeworth's description (*Trans. Linn. Soc.* xx. 60 [1851]) and his type specimen in the Kew Herbarium clearly show. The name *Lonicera obovata*, however, cannot be replaced by *Lonicera parvifolia*, since the latter is homonymous to the still older *Lonicera parvifolia* of Hayne.

EXPLANATION OF THE PLATE.

PLATE XLIV. LONICERA MYRTILLUS.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. Vertical section of a flower, enlarged.
4. A corolla laid open, enlarged.
5. Cross section of an ovary, enlarged.
6. A fruiting branch, natural size.
7. A seed, enlarged.

LONICERA MYRTILLUS, Hook. f. & Thom.

LONICERA THIBETICA, Bur. & Franch.

Lonicera Thibetica, Bureau & Franchet, *Jour. de Bot.* v. 48 (1891). — Mottet, *Rev. Hort.* 1902, 448, f. 198–200.

Leaves short-petiolate, deciduous, often in whorls of three, or rarely of four, oblong-lanceolate, from 1 to 3 centimetres long, acute or obtusish and mucronulate, rounded or abruptly narrowed at the base; on the upper surface dark green and minutely glandular when young, soon becoming glabrous and lustrous, densely white-tomentose on the lower surface; on sterile branches sometimes glabrous on both sides and dull bluish green above; petioles from 1 to 5 millimetres in length. Flowers in peduncled pairs in the axils of the middle and lower leaves; peduncles puberulous, from 1 to 10 millimetres long; bracts oblong to linear-oblong, acute or obtuse, about as long or sometimes longer than the calyx, sparingly glandular, tomentose beneath or nearly glabrous; bractlets nearly as long as the ovaries, rarely half as long, connate into a four-lobed cupule or sometimes (in cultivated plants) divided between the ovaries to the base, glandular-ciliate; calyx-teeth lanceolate, one third to one half as long as the corolla tube, glandular-ciliate, otherwise nearly glabrous; corolla pink or purplish pink, fragrant, salverform, from 1.2 to 1.6 centimetres long, rarely shorter, puberulous and glandular without; tube cylindric, equal at the base, furnished with long hairs within, especially near the mouth, from two to three times as long as the spreading five-lobed limb; lobes ovate, obtuse; stamens inserted about the middle of the tube; filaments very short, glabrous; anthers oblong, not reaching the mouth of the tube; style about half as long as the tube, glabrous; ovaries distinct, ovoid, glabrous, three-celled. Berries distinct, ovoid, about 1 centimetre long, orange-scarlet, glossy, crowned by the persistent calyx; seeds ovoid, compressed, about 5 millimetres in length, with a finely granulose testa.

A shrub, from 0.5 to 1.5 metres in height, with slender spreading and recurving often procumbent branches forming a dense intricate bush much broader than high; young branchlets villose-puberulous or tomentulose; older branches clothed with grayish brown shredding bark. Flowers appear in May and June and sparingly during the whole summer and autumn. Fruit ripens in August or September.

Tibet: between Lhassa and Batang, 1890, *Bonvalot and Henri d'Orléans* (type!); Kiala, *Soulié* (No. 238); China: Sze-chuen, west Sze-chuen and Tibet frontier, *A. E. Pratt* (No. 245), west Sze-chuen, *Przewalski*, *Potanin;* Ta-tsien-lu, *Soulié* (No. 261); Yunnan, *Delavay* (No. 2337).

Lonicera Thibetica is closely related to *Lonicera rupicola*, Hooker f. & Thomson, and to *Lonicera syringantha*, Maximowicz. From the former it differs in its narrower often acute leaves, their white tomentose under side and in the connate bractlets; from the latter chiefly in its pubescence, the shorter corolla-tube and the low prostrate habit.

Like those of *Lonicera rupicola*, the sterile branches and the leaves of *Lonicera Thibetica* often become perfectly glabrous, the dark glossy upper surface of the leaves changes to a dull bluish green color, and the leaves themselves often become broader and more obtuse, and then resemble those of *Lonicera syringantha.* Another peculiarity of the two species is a teratological tendency of cultivated plants toward dialysis and phyllody which shows itself in the calyx-teeth and the bractlets becoming more or less leaf-like, distinct, and elongated.

Lonicera Thibetica was introduced into cultivation in 1895, when seeds were sent from Sze-chuen by the Abbé Farges to Monsieur M. L. de Vilmorin of Paris.[1] In the Arnold Arboretum it has proved hardy with slight protection during

[1] *Jour. Soc. Nat. Hort. France*, sér. 3, xix. 743.

the winter and seems well suited for planting on rocky slopes and banks. The flowers are very fragrant, and the bright color of the berries makes the shrub ornamental in the autumn.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE XLV. LONICERA THIBETICA.

1. A flowering branch, natural size.
2. A pair of flowers of a cultivated plant, enlarged.
3. A pair of flowers of a specimen collected by Pratt in western Sze-chuen, enlarged.
4. A flower, the corolla displayed, enlarged.
5. Cross section of an ovary, enlarged.
6. A fruiting branch, natural size.
7. A seed, enlarged.

LONICERA THIBETICA, Bur. & Fr.

LONICERA TRAGOPHYLLA, HEMSL.

LONICERA TRAGOPHYLLA, Hemsley, *Jour. Linn. Soc.* xxiii. 367 (1888); Græbner, *Engler Bot. Jahrb.* xxix. 594 (*Flora von Central-China*).
CAPRIFOLIUM TRAGOPHYLLUM, Kuntze, *Rev. Gen. Pl.* i. 274 (1891).

Leaves short-petiolate or sessile, ovate-oblong to oblong, from 7 to 14 centimetres long, membranaceous, with a narrow diaphanous margin, obtuse or subacute at the apex, cuneate at the base, dark green and glabrous above, glaucous and pubescent beneath, chiefly along the veins, rarely on the whole under side, the uppermost pair below the inflorescence connate into a suborbicular or oval disk, usually obtuse and mucronulate at both ends, the one or the two pairs below connate at the base. Flowers yellow, disposed in a terminal stalked head usually consisting of two whorls; peduncle glabrous, from 0.5 to 1.5 centimetres long; bractlets suborbicular, about one third as long as the ovate ovaries; calyx-teeth minute, triangular; corolla bilabiate, from 6 to 7.5 centimetres long, the tube slender, slightly curved, nearly three times as long as the limb, glabrous without, sparingly puberulous within, lower lip narrowly oblong, spreading, upper lip upright, divided for about one third its length into four oval or ovate rounded lobes; stamens nearly as long as the limb, glabrous, inserted at unequal heights, the one below the middle incision of the upper lip lower than the others; style glabrous, exceeding the stamens. Fruits scarlet, subglobose, about 1 centimetre in diameter, few-seeded; seeds ovate, compressed, 7 millimetres long, yellowish white, with a finely granulate testa.

A twining shrub, glabrous except the under side of the leaves; young branchlets green and usually partly tinged with purple; branches of the previous year light yellowish brown or grayish brown, smooth; winter-buds with several outer scales, ovate, acute, brown, and lustrous, the inner scales leafy.

China: Hupeh, *A. Henry* (Nos. 1707, 4010, 5898), *E. H. Wilson* (No. 1095); Sze-chuen, *Farges* (Nos. 109, 834, in herb. Paris), *A. von Rosthorn* (No. 1901 in herb. Berlin); Kansu, *Potanin* (in herb. Kew and Berlin).

Lonicera tragophylla seems most nearly related to *Lonicera Stabiana*, Pasquale, from which it differs in its much larger flowers and in the pubescence inside the tube; by the same characters and also by its shorter bractlets it differs from *Lonicera Etrusca*, Santi; from *Lonicera Caprifolium*, Linnæus, it is further removed by the stalked head-like inflorescence. It has the largest flowers of any species in the subgenus; and it is the only representative in central and eastern Asia of the almost exclusively Mediterranean subsection Eucaprifolium, Spach.

From its native habitat it is to be expected that this beautiful species may prove hardy in the United States and in central and perhaps northern Europe, at least with some protection during the winter.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate XLVI. Lonicera tragophylla.

1. A flowering branch, natural size.
2. A corolla laid open, natural size.
3. A pistil, natural size.
4. A fruiting branch, natural size.

LONICERA TRAGOPHYLLA, Hemsl.

TECOMA HYBRIDA, JOUIN.

(Tecoma radicans × Chinensis.)

TECOMA HYBRIDA (Tecoma radicans × Chinensis), Jouin, *Jardin*, 1899 ex *Garden*, lv. 315 (1899).

Leaves impari-pinnate, from 15 to 30 centimetres in length; petioles glabrous, from 3 to 5 centimetres long; leaflets seven to eleven, ovate to elliptic-ovate, from 4 to 9 centimetres in length, coarsely serrate, usually long-acuminate, abruptly narrowed into petiolules rarely more than 1 centimetre long, the uppermost leaflets sometimes nearly sessile with the limb more or less decurrent, dark green, glabrous and somewhat lustrous on the upper surface, pale green below and usually pubescent along the veins, or rarely pubescent over the whole under surface. Flowers in terminal usually loose panicles often from 10 to 15 centimetres in length, with the lower branches from 2.5 to 5 centimetres long, becoming gradually shorter toward the apex, all terminated by three-flowered cymes; pedicels from 0.5 to 1 centimetre in length, with minute subulate deciduous bractlets; calyx campanulate, from 2 to 2.5 centimetres long, divided for about one third of its length into five ovate long-acuminate lobes; corolla funnel-form, campanulate, from 8 to 9 centimetres in length, with an orange-yellow tube and scarlet limb, the tube gradually widened from the tubular base into the spreading five-lobed limb about 5 centimetres in diameter, its lobes suborbicular; stamens four, two longer and two shorter; style somewhat shorter than the tube, surmounted by a two-lobed stigma. Fruit cylindric, from 15 to 20 centimetres long and 1.5 to 2.5 centimetres broad, gradually narrowed at both ends and usually curved, with winged sutures, light olive-brown; seeds compressed, light brown, about 1 centimetre long, with the hyaline wings oblong in outline and about 3 centimetres in length.

A shrub, climbing by aerial rootlets; young branchlets green and glabrous, older branches covered with pale yellowish white bark. Flowers from July to September. The fruits ripen in September or October.

The plant which is here figured and described was received at the Arnold Arboretum from the P. J. Berckmans Company of Augusta, Georgia, under the name *Tecoma hybrida*. It is obviously a hybrid between *Tecoma radicans*, Jussieu, and *Tecoma Chinensis*, K. Koch (*Tecoma grandiflora*, Loiseleur), as it is exactly intermediate between these two species in all its characters. From *Tecoma radicans* it is chiefly distinguished by the looser and larger inflorescence, the much wider corolla-tube with a broader limb, and by the longer acuminate calyx-teeth; from *Tecoma Chinensis* it differs in the pubescent covering of the under side of the leaflets, in the longer corolla-tube which much exceeds the calyx, and in the shorter calyx-lobes.

A plant, cultivated at the Arnold Arboretum as *Tecoma radicans grandiflora atropurpurea*, does not differ materially from this hybrid. According to Koehne,[1] *Tecoma Chinensis aurantiaca*, Hort., is probably a hybrid of the same parentage, and Jouin[2] believes *Tecoma Princei coccinea grandiflora*, Hort., to be also a hybrid between these two species.

As a garden plant *Tecoma hybrida* is valuable, for its flowers are almost as large and showy as those of *Tecoma Chinensis*, and it is hardier than that species. In the Arnold Arboretum, where the Chinese species cannot be grown in the open air, the hybrid lives through the winter when slightly protected. Like *Tecoma Chinensis*, it begins to flower while small, and it does not appear to climb so high as *Tecoma radicans*.

ALFRED REHDER.

Arnold Arboretum.

[1] *Deutsche Dendr.* 522.

[2] *Gard.* lv. 315.

EXPLANATION OF THE PLATE.

Plate XLVII. Tecoma hybrida.

1. An inflorescence, natural size.
2. A flower, natural size.
3. A calyx with the style, natural size.
4. A leaf, natural size.
5. A fruit, natural size.
6. A flower of *Tecoma radicans*, natural size.
7. A calyx and style of *Tecoma radicans*, natural size.
8. A flower of *Tecoma Chinensis*, natural size.
9. A calyx and style of *Tecoma Chinensis*, natural size.

TECOMA HYBRIDA, Jouin

PICEA MORINDOIDES, REHD.

PICEA MORINDOIDES, *n. sp.*

Leaves linear, straight and slender, from 2.5 to 3.5 centimetres long, and from 0.7 to 1.2 millimetres broad, acuminate, terminated by a callous sharp tip, somewhat flattened and distinctly keeled on each side (rhomboidal in transverse section), with two white lines on the upper surface consisting each of about six rows of stomata, dark bluish green on the under surface without stomata; furnished beneath the epidermis with one layer of strengthening cells all around, doubled beneath the keel on each side, usually with two resin ducts on the under side close to the epidermis; pulvini slender, pointing forward, not thickened or only slightly thickened at the base. Cones oblong, about 8 centimetres long, 4 centimetres broad when open or scarcely 3 centimetres broad when closed; scales greenish or purplish green, with a purplish border when young, at maturity yellowish brown and lustrous, spatulate-obovate, 2 centimetres long, from 1.2 to 1.4 centimetres broad, the upper part rhombic, with truncate apex and finely serrulate with a slightly wavy margin, appressed when young, spreading upward and rather thin and flexible at maturity; bracts oblong-ovate, acute, from 4 to 5 millimetres long; seeds obovate, about 5 millimetres long, light grayish brown, their oblong or oblong-obovate hyaline wings about 1.2 centimetres in length.

A tree, with whorled spreading branches and slender pendulous or toward the top of the tree spreading branchlets; young branchlets glabrous, yellowish, with pulvini of the same color, becoming yellowish gray the third year; winter-buds ovate, from 5 to 6 millimetres long, obtuse, light yellowish brown, slightly or not at all resinous; bud-scales few, ovate, obtuse.

Native country unknown, probably eastern Asia.

Picea morindoides seems, especially in its cones, most nearly related to *Picea Alcockiana*, Carrière, but differs from that species in its more elongated scales, in its slenderer and longer leaves with stomata only on one side, in the absence of the pubescence on the leading shoots, and in the pendulous branchlets. From the other Piceas with the leaves stomatiferous only on the upper side, like *Picea Omorika*, Bolle, *Picea Sitchensis*, Carrière, *Picea Ajanensis*, Fischer, and *Picea Breweriana*, Watson, it is easily distinguished by its long and slender acuminate leaves, and by the shape of the cone-scales, and from the three first named species also by its habit, which is very similar to that of the Himalayan *Picea Smithiana*, Boissier (*Picea Morinda*, Link); and in allusion to this similarity the specific name *morindoides* is proposed.

The resemblance of the cones to those of *Picea Alcockiana* induced me to consider this tree at first as a variety of that species, an opinion which I communicated to Monsieur Allard; this explains the mention of this name by Mottet in his recently published book on Conifers.[1]

The species is known only in cultivation. The original tree, of uncertain origin, grows in the arboretum of Monsieur G. Allard at Angers, who drew my attention to it when I visited two years ago his interesting and rich collection of trees and shrubs. Young grafted plants propagated from branches sent by Monsieur Allard are now growing at the Arnold Arboretum, but their resistance against the climate of New England has not yet been proved. If this species can support this climate, it will be a valuable substitute for the picturesque *Picea Smithiana*, which is not hardy in northern latitudes.

ALFRED REHDER.

Arnold Arboretum.

[1] *Picea Alcockiana*, var. *morindoides*, Mottet, *Conifères et Taxacées*, 273 (1902), without description.

EXPLANATION OF THE PLATE.

Plate XLVIII. Picea morindoides.

1. A fruiting branch, natural size.
2. A scale, upper side, with the seeds, enlarged.
3. A scale, lower side, with the bract, enlarged.
4. A seed, enlarged.
5. A leaf, upper side, enlarged.
6. A leaf, under side, enlarged.
7. Cross section of a leaf, enlarged.
8. A winter branch, the leaves removed, natural size.
9. Part of a young branch, enlarged.

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PICEA MORINDOIDES, Rehd.

SOLANUM MOLINUM, FERNALD.

SOLANUM MOLINUM, *n. sp.*

Leaves oblong-lanceolate to oblong, entire, bluntly acuminate or rounded at the apex, acute at the base, from 3 to 9 centimetres long, from 1.3 to 3.5 centimetres broad, dull green and minutely stellate-puberulent above, closely pubescent with whitish stellate hairs beneath; petioles slender, from 7 to 12 millimetres in length. Cymes loosely branched, from 2 to 5 centimetres long, the peduncles and pedicels from 5 to 8 millimetres long, densely canescent-stellate; calyx 4 millimetres high, with lance-ovate lobes; corolla 1.3 centimetres long, the lanceolate lobes pulverulent without; anthers linear, 5 millimetres long, on filaments one fifth as long. Fruit red, smooth, 1 centimetre in diameter.

A shrub, with elongate slender branches covered by a thin translucent early deciduous epidermis, and beneath by a finely furrowed gray-brown thicker bark; branchlets densely canescent-pulverulent, with fine stellate hairs.

Mexico: Oaxaca, near the town of Oaxaca, *C. Conzatti* and *V. González* (No. 1219), June, 1901.

Solanum molinum belongs to the large section Torvaria, and is probably nearest related to *Solanum Hartwegi*, Bentham, a larger species of broad range from the valley of Mexico to the Gulf coast, and south to Costa Rica. From that species *Solanum molinum* is readily distinguished by its smaller leaves and flowers, and by the fine close pubescence, which in *Solanum Hartwegi* is very much longer, and forms a dense lanate covering.

M. L. FERNALD.

Gray Herbarium.

EXPLANATION OF THE PLATE.

Plate XLIX. Solanum molinum.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A stamen, front and rear views, enlarged.
4. A fruiting branch, natural size.
5. A seed, enlarged.

SOLANUM MOLINUM, Fern.

EUPHORBIA LUCIISMITHII, Robins. & Greenm.

Euphorbia Luciismithii, Robins. & Greenm. *Proc. Am. Acad.* xxxii. 36 (1896).

Leaves verticillate, two to five-nate, elliptic or elliptic-oblong, from 1 to 3.5 centimetres long, from 0.5 to 1.5 centimetres broad, obtuse or rounded and subapiculate at the apex, rounded to subacute at the base, glabrous or glabrate above, paler and soft grayish-tomentulose beneath; petioles from 0.5 to 2 centimetres long, tomentulose. Cymes terminal, compound, flat topped, leafy; floral leaves oblanceolate, cuneate, mucronulate, one-nerved, white or rarely red, about 6 millimetres in length, 2.5 millimetres in breadth, involucres campanulate, puberulent, nearly sessile; lobes five, fimbriate glands commonly five, oblong; appendages oblong or subrotund, undulate, white, nearly or quite 1 millimetre long; ovary glabrous. Capsule three-lobed, about 6 millimetres long; seeds oblong, somewhat four-angled, ashy, glabrous, faces rugulose and marked with irregular brown lines.

A tall branching tomentulose glaucous shrub, from 3 to 4.5 metres in height, with subterete striate branches.

Mexico: State of Oaxaca, Rancho de Calderon, altitude 1695 metres, *Rev. Lucius C. Smith* (No. 181), August 13, 1894; Jayacatlan, altitude 1225 metres, *Rev. Lucius C. Smith* (No. 182), September 10 and November 4, 1894; in rocky gulches, Monte Alban, altitude 1785 metres, *C. G. Pringle* (No. 4903), September 14 and November 27, 1894; 9.5 kilometres above Dominguillo, altitude 1385 to 1695 metres, *E. W. Nelson* (No. 1880), October 30, 1894; Oaxaca, altitude 1750 metres, *C. Conzatti* and *V. González* (No. 1043), July and August, 1900.

Euphorbia Luciismithii belongs to the section Alectoroctonum, Boissier, in *De Candolle Prodr.* xv. pt. ii. 59, and is most nearly related to *Euphorbia leucocephala*, Lotsy, *Bot. Gazette*, xx. 350, t. xxiv., from which it differs in the form of the appendages of the glands of the involucre, and in the less conspicuously petaloid bracts of the inflorescence.

J. M. Greenman.

Gray Herbarium.

EXPLANATION OF THE PLATE.

Plate L. Euphorbia Luciismithii.

1. A flowering branch, natural size.
2. Portion of an inflorescence, enlarged.
3. A floral leaf, enlarged.
4. An involucre of staminate flowers, enlarged.
5. An involucre with a pistillate flower, enlarged.
6. An involucre laid open, enlarged.
7. A fimbriated gland of the involucre, enlarged.
8. An appendage of the involucre, enlarged.
9. Part of a fruiting cyme, natural size.
10. A coccus, enlarged.
11. A seed, enlarged.

EUPHORBIA LUCIISMITHII, Robins. & Greenm.

SILVA OF NORTH AMERICA

IN September, 1890, Messrs. Houghton, Mifflin & Company announced the publication of Sargent's *Silva of North America* in twelve quarto volumes, illustrated with six hundred plates engraved in Paris under the direction of A. Riocreux from drawings made by C. E. Faxon. The last of these volumes was published in January, 1899, the twelve volumes containing six hundred and twenty plates.

The publication of this exhaustive and monumental work has stimulated the study of trees in the United States in a remarkable and gratifying manner, and during its progress the number of trees recognized by botanists in North America north of Mexico, the region covered by the *Silva*, has increased to 567 from 422, the number announced in Messrs. Houghton, Mifflin & Company's circular of 1890. For this reason two supplementary volumes were added, containing 115 new plates and a thorough index of the entire work. They were published in the fall of 1902, thus completing the set.

Professor Sargent is recognized as the highest authority on the subject he treats. His position as Director of the Arnold Arboretum of Harvard University, the richest dendrological collection in America, which has been formed by him, and his opportunities while in the employ of the government of the United States for exploring the forests and studying the trees in every part of the country, opportunities supplemented by his connection with the Northern Transcontinental Survey, and by the duty intrusted to him of forming for the New York Museum of Natural History a collection to illustrate the forest products of North America, specially qualify him for this work, in the preparation of which he has been actively engaged during the last twenty-five years.

No cost or pains have been spared in the mechanical execution of the illustrations of this work, which has taken the first rank among those great scientific works of which Americans are justly proud. It must always remain a standard authority on the subject which it treats.

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TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

PREPARED CHIEFLY FROM MATERIAL AT
THE ARNOLD ARBORETUM OF
HARVARD UNIVERSITY

AND EDITED BY

CHARLES SPRAGUE SARGENT

Director of the Arnold Arboretum: Author of
The Silva of North America

PART III

MAGNOLIA PYRAMIDATA
LIRIODENDRON CHINENSE
CRATÆGUS PAUSIACA
CRATÆGUS INSIGNIS
CRATÆGUS DISJUNCTA
CRATÆGUS BELLULA
CRATÆGUS LANUGINOSA
CRATÆGUS INDUCTA
CRATÆGUS KELLOGGII
CRATÆGUS FAXONI
TILIA MONGOLICA
EVONYMUS SIEBOLDIANUS
EVONYMUS BUNGEANUS
EVONYMUS PATENS
EVONYMUS RADICANS, VAR. VEGETUS
ACER ARGUTUM
ACER DIABOLICUM
VIBURNUM BRACTEATUM
LONICERA WEBBIANA
LONICERA INTERRUPTA
LIGUSTRUM CILIATUM
LIGUSTRUM AMURENSE
ORTHOCARPA NELSONI
VACCINIUM POASANUM
PINUS TERTHROCARPA

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1903

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TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

THIS work consists of a series of plates, accompanied by brief descriptions, of new or little known trees and shrubs. It is edited by Professor C. S. Sargent, the author of *The Silva of North America* and the Director of the Arnold Arboretum of Harvard University, with the assistance of a number of specialists; and the plates are reproductions of original drawings made by Mr. C. E. Faxon, the most skillful and experienced botanical draftsman in America, whose work is familiar to the readers of Professor Sargent's *Silva* and of *Garden and Forest*. The material which serves as a basis for the work has been derived largely from the living collections and herbarium of the Arnold Arboretum. It will not be confined wholly to North American plants, but will include also the woody plants of other regions, especially those of the northern hemisphere which may be expected to flourish in the gardens of the United States and Europe, and those of special commercial or economic interest and value. This publication does not duplicate in any way *The Silva of North America*, but is supplementary to that publication, as from time to time it will contain descriptions and figures of trees newly discovered in North America.

The work will be published in parts at irregular intervals. Each part will contain twenty-five plates, and a volume will consist of four parts, of which it is hoped that at least two will appear each year, beginning in the fall of 1902. The parts will be sold separately, at $5.00 *net*, postage extra. A title-page and an index for each volume will be furnished with the fourth part.

A prospectus containing specimen pages of Part I, and two of the plates, will be submitted upon request. Address

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MAGNOLIA PYRAMIDATA, PURSH.

MAGNOLIA PYRAMIDATA, Pursh, *Fl. Am. Sept.* ii. 382 (1814). — De Candolle, *Syst.* i. 454; *Prodr.* i. 80. — Hayne, *Dendr. Fl.* 117. — Lindley, *Bot. Reg.* v. t. 407. — Loddiges, *Bot. Cab.* t. 1092. — Rafinesque, *Med. Fl.* ii. 33. — Don, *Gen. Syst.* i. 83. — Loudon, *Arb. Brit.* i. 277, t. — Seringe, *Fl. Jard.* iii. 230.

MAGNOLIA AURICULATA, β PYRAMIDATA, Nuttall, *Gen.* ii. 18 (1818). — Torrey & Gray, *Fl. N. Am.* i. 43.

MAGNOLIA FRASERI, Chapman, *Fl.* 14 (in part) (not Walter) (1860). — Sargent, *Silva N. Am.* i. 15 (in part).

Leaves obovate-spatulate, the wide apex gradually or abruptly narrowed into a short blunt point, auriculate at the base, with more or less spreading lobes, thin, glabrous, light yellow-green on the upper, pale and glaucous on the lower surface particularly while young, from 1.7 to 2.5 decimetres long, from 1 to 1.5 decimetres wide, with stout yellow midribs, numerous slender forked primary veins, and conspicuously reticulate veinlets; petioles stout, from 3 to 6 centimetres in length. Flowers creamy white, from 1 to 1.2 decimetres in diameter when fully expanded; sepals oblong-obovate, abruptly narrowed to the short-pointed apex, much shorter than the oblong acuminate petals gradually narrowed from near the middle to the base; receptacle 1.8 centimetres in length, the apiculate tips of the connectives of the anthers slender, elongated, extrorsely curved. Fruit oblong, from 6 to 7.5 centimetres long, bright rose color; points of the carpels stout, incurved, persistent; seeds ovate, compressed.

A slender tree, from 7 to 10 metres in height, with ascending branches and slender branchlets bright red-brown and marked by small pale lenticels in their first season, later becoming ashy gray.

Southern Georgia through western Florida to southern Alabama in low rich soil near the streams of the coast region: Flat Creek, near River Junction, Gadsden County, Florida, April 21, 1899 (No. 1355 A, Herb. Biltmore); River Junction, Florida, September 22, 1900 (No. 1355 B, Herb. Biltmore); Bristol, Florida, August 21, 1900 (No. 6746, Herb. Biltmore); Choctahatchee River, Dale County, Alabama, June 7, 1902 (No. 6415, Herb. Biltmore); banks of Pea River, Coffin County, Alabama, June 13, 1902 (No. 6480, Herb. Biltmore).

The earliest description of what is probably *Magnolia pyramidata* appeared in William Bartram's *Travels* published in 1791. Bartram had found it in the "maritime parts of Georgia, particularly on the banks of the Altamaha."[1] It is said to have been introduced by Lyon in 1811 into English gardens, where it flowered a few years later.[2] Nuttall, and Torrey and Gray considered it a variety of *Magnolia Fraseri*, which it resembles in the form of the leaves, and later writers on the North American flora have entirely neglected it until the collections made recently in Florida and Alabama by the botanists of the Biltmore Herbarium have again called attention to this tree and show its distinctive characters and peculiar distribution. From *Magnolia Fraseri* it differs in its smaller more abruptly pointed thinner leaves, in its much smaller flowers, with more slender and elongated tips of the anther-connectives, and in the smaller fruit, with shorter and incurved points of the carpels. *Magnolia pyramidata* is found only in the low country, while *Magnolia Fraseri* is a mountain tree, probably never descending below elevations of 600 metres above the level of the sea.[3]

The specimens from which Mr. Faxon has made the drawing reproduced in our plate are preserved in the Biltmore Herbarium, and I am indebted to Mr. C. D. Beadle for the opportunity of making use of them.

C. S. S.

[1] *Travels*, 340. [2] *Bot. Reg.* v. t. 407.

[3] So much of the description of the range of *Magnolia Fraseri* in *The Silva of North America* (i. 15) as relates to western Florida and southern Alabama must be considered to refer to *Magnolia pyramidata*.

EXPLANATION OF THE PLATE.

Plate LI. Magnolia pyramidata.

1. A flowering branch, natural size.
2. An anther, front and rear views, enlarged.
3. A fruit, natural size.
4. A carpel of the fruit, enlarged.
5. A seed, enlarged.

C. E. Faxon del.

MAGNOLIA PYRAMIDATA, Pursh

LIRIODENDRON CHINENSE, Sarg.

Liriodendron Chinense, *n. sp.*

Liriodendron, *sp. nov.?* Le Marchant Moore, *Jour. Bot.* xiii. 225 (1875).

Liriodendron Tulipifera, var. ? Chinense, Hemsley, *Jour. Linn. Soc.* xxiii. 25 (1886).

Liriodendron Tulipifera, var. Sinensis, Diel, *Engler Bot. Jahrb.* xxix. 322 (*Flora von Central-China*) (1901).

Leaves sinuately four-lobed, nearly truncate or more or less deeply lobed at the apex, rounded, truncate or slightly cordate at the base, dark green and lustrous on the upper surface, pale and glaucous on the lower surface, from 1.2 to 1.4 decimetres long and as broad or rather broader than long; petioles stout, from 7 to 9 centimetres in length. Flowers from 5 to 6 centimetres in diameter when fully expanded; sepals and petals oblong-obovate, gradually narrowed toward the apex, contracted below into a narrow base, the petals only slightly broader than the sepals and rarely more than 1.5 centimetres in width. Fruit-cone slender, elongated, from 9 to 10 centimetres long, 2.5 centimetres wide, the fertile inner carpels broad and rounded at the apex, those of the outer rows narrow and acuminate.

China: Kiangsi, Lushan Mountains, Kinking, *Shearer*, 1875, *Maries*, 1877; Hupeh, *A. Henry* (Nos. 5836 and 5836 A), 1885–89, western Hupeh, *E. H. Wilson*, 1900.

The Chinese Tulip-tree is described as a small tree with spreading branches.[1] It is of peculiar interest as the only known Old World member of a genus now represented in eastern North America by a single species, but at an earlier period widely spreading over North America and Europe. Judging by the insufficient material which at first reached Europe and America, botanists considered the Chinese tree identical with the American *Liriodendron Tulipifera*, Linnæus, or as a variety of it,[2] but the beautiful and complete specimens recently collected by Mr. Wilson in Hupeh and sent to the Arboretum by James Veitch & Sons, under whose auspices they were collected, show that the size of the flowers, which are not more than half as large as those of the American species, with much narrower petals, the narrow and more elongated fruit-cone and the shape of the inner fruit carpels, are quite distinct from the American species. The leaves of the two trees are of the same form and apparently of the same size, but those of the Chinese tree are paler and more glaucous on the lower surface, a character of no great importance, as the leaves of the American species are often glaucous on the lower side. The seedling plants raised in the Veitchian Nursery at Coombe Wood, near London, from seeds collected by Mr. Wilson, are still too young to make it possible to say whether the Chinese Tulip-tree will flourish in Europe and the United States.

Our illustration is made from the specimens collected by Mr. Wilson. C. S. S.

[1] "Dr. Henry collected specimens on the mountains both north and south of the river Yangtze, in the province of Hupeh. At Paokang he found it forming a spreading shrub, six feet high, at an elevation of 6000 feet. At Chienshih he collected flowering specimens from a tree thirty feet high, and leaves from a young tree in the same locality are a foot across in either direction." (Hemsley, *Gard. Chron.* ser. 3, vi. 718.)

[2] Hemsley, *Garden and Forest*, ii. 123; *Gard. Chron. l. c.*

EXPLANATION OF THE PLATE.

Plate LII. Liriodendron Chinense.

1. A flowering branch, natural size.
2. Vertical section of a flower, natural size.
3. A stamen, front and rear views, enlarged.
4. A fruiting branch, natural size.
5. An inner carpel of the fruit, enlarged.
6. An outer carpel of the fruit, enlarged.

C. E. Faxon del.

LIRIODENDRON CHINENSE, Sarg.

CRATÆGUS PAUSIACA, ASHE.

CRATÆGUS PAUSIACA, Ashe, *Ann. Carnegie Inst.* i. 390, in part (May, 1902).

Leaves oblong-obovate to oval, rounded or acute at the apex, gradually narrowed from near the middle and concave-cuneate at the entire base, and finely doubly serrate above, with straight glandular teeth; more than half grown when the flowers open and then membranaceous, dark yellow-green and slightly villose above and along the under side of the midribs and veins; at maturity glabrous, dark dull yellow-green on the upper surface, paler on the lower surface, from 5 to 6 centimetres long, from 3 to 4 centimetres wide, with slender yellow midribs and five or six pairs of thin primary veins extending very obliquely to the apex of the leaf; petioles slender, wing-margined to below the middle, deeply grooved, villose only early in the season, from 1.5 to 2.5 centimetres long; stipules linear, bright red, minute, caducous; on vigorous leading shoots leaves elliptical to rhombic, long-pointed at the apex, slightly or deeply divided into broad lateral lobes, very coarsely serrate, often from 8 to 9 centimetres in length and from 5 to 6 centimetres in width, their stipules foliaceous, lunate, glandular-serrate, often 1.5 centimetres long or rather longer than the stout petioles. Flowers 1.5 centimetres in diameter on long slender hairy pedicels, in broad many-flowered thin-branched villose corymbs; bracts and bractlets linear, small, mostly caducous before the flowers open; calyx-tube narrowly obconic, villose below, with closely appressed white hairs, glabrous above, the lobes abruptly narrowed from the base, slender, acuminate, tipped with minute dark glands, entire or occasionally obscurely toothed above the middle, glabrous on the outer, villose on the inner surface, reflexed after anthesis; stamens ten to fifteen, rarely twenty; anthers dark rose color; styles two or three, surrounded at the base by a broad ring of pale tomentum. Fruit on elongated slender slightly hairy pedicels, in drooping many-fruited clusters, oblong to slightly obovate, full and rounded at the ends, dull brick red marked by large pale dots, from 1 to 1.5 centimetres in length, about 1 centimetre in width; calyx small, sessile, with a narrow deep cavity and spreading appressed lobes, mostly deciduous from the ripe fruit; flesh thin, hard, slightly juicy, green or greenish yellow; nutlets three or four, thin, acute or obtuse at the ends, very prominently ridged on the back, with a high broad deeply grooved ridge, from 8 to 10 millimetres long.

A tree, 7 to 8 metres in height, with a tall straight trunk often 3 decimetres in diameter, covered with dark brown scaly bark, stout wide-spreading branches forming a broad symmetrical round or flat-topped head, and slender nearly straight branchlets light orange-green and sparingly villose when they first appear, becoming light orange-brown during their first season and light or dark gray-brown the following year, and armed with many stout or slender straight orange-brown shining spines from 4 to 6 centimetres in length, long persistent on the branches and trunk, finally ashy gray and sometimes from 2 to 3 decimetres long and furnished with many long slender lateral spines. Flowers from the 20th to the end of May. Fruit ripens about the middle of October.

Pennsylvania: Bucks County, *W. W. Ashe*, June and October, 1900; dry limestone hills, Durham, *C. D. Fretz*, May and October, 1901; Delaware County, Newtown, near Crum Creek, above the West Chester road, *B. H. Smith*, May and October, 1901, May, 1902, *Smith, Canby, and Sargent*, September, 1902.

This is one of the largest and handsomest of the Thorn-trees of the eastern states, and is well distinguished from the other Crus-galli species by the shape of the thinner and duller leaves, the peculiar color of the young branchlets and their

spines, and by the fruits gracefully drooping on long stalks. It appears to be most closely related to *Cratægus fecunda*, Sargent, of the neighborhood of St. Louis, Missouri. The oldest specimen which I have seen is the one collected by Mr. Ashe in 1890. Specimens under this name received from the herbarium of the Carnegie Institute and collected in the region of Pittsburg, Pennsylvania, belong certainly to some other species, and it is probable that *Cratægus pausiaca* is confined to Bucks and Delaware counties, where, except in Newtown, Delaware County, it appears to be extremely rare.

C. S. S.

EXPLANATION OF THE PLATE.

Plate LIII. Cratægus pausiaca.

1. Part of a flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, ventral view, enlarged.
7. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS PAUSIACA, Ashe

CRATÆGUS INSIGNIS, SARG.

CRATÆGUS INSIGNIS, *n. sp.*

Leaves oval to obovate or suborbicular, rounded or acute at the apex, concave-cuneate at the entire base, coarsely and doubly serrate above, with glandular teeth; tinged with red as they unfold, and more than half grown when the flowers open and then membranaceous, dark yellow-green, and sparingly villose along the midribs above and pale and glabrous below; at maturity thin but firm in texture, glabrous, dark green and lustrous on the upper surface, pale yellow-green on the lower surface, from 5.6 to 7 centimetres long, from 4.5 to 6 centimetres wide, with slender orange-colored midribs and five or six pairs of very thin primary veins; petioles stout, wing-margined toward the apex, grooved, occasionally glandular, with minute deciduous glands, from 1 to 2 centimetres in length; stipules oblong-obovate, acuminate, glandular-serrate, about 1.5 centimetres long, caducous; on vigorous shoots leaves orbicular to elliptical or broadly ovate, often short-pointed, from 8 to 9 centimetres wide, with stout broadly-winged petioles and foliaceous lunate coarsely serrate stipules. Flowers 2 centimetres in diameter, on long slender slightly villose pedicels, in compact usually eight to ten-flowered hairy compound corymbs; bracts and bractlets linear to linear-obovate, glandular, caducous; calyx-tube broadly obconic, the lobes abruptly narrowed from the base, slender, acute, finely glandular-serrate; stamens twenty; anthers pale yellow; styles three or four, usually four. Fruit drooping on slender red pedicels, subglobose, dark dull crimson, marked by numerous large pale dots, from 1.4 to 1.5 centimetres in diameter; calyx sessile, with a broad deep cavity, and closely appressed long-pointed slightly serrate lobes bright red on the upper side at the base; flesh thick, yellow, dry, and mealy; nutlets usually four, acute at the ends, slightly or deeply grooved on the back, about 8 millimetres in length.

A shrubby tree, from 4 to 5 metres tall and broad, with stout ascending stems and branches covered with dark slightly scaly bark, and slender nearly straight branchlets marked by small pale lenticels, dark orange-green more or less tinged with red and slightly hairy, with long white caducous hairs when they first appear, soon becoming light red-brown and lustrous, dark gray-brown in their second season, and unarmed or armed with slender straight dark purple shining spines usually about 3 centimetres long. Flowers the 10th of May. Fruit ripens early in November.

Rich alluvial soil of the Mississippi bottoms near Cahokia, Illinois and a few miles below East St. Louis, *C. S. Sargent*, September 26, 1900, *J. B. S. Norton*, April 9, 1901, *J. B. Kellogg*, November, 1902.

This handsome and interesting plant appears to have more relationship with the Crus-galli Group than with any of the other described groups, but its thin leaves, large flowers in few-flowered clusters, and the absence of well-defined dorsal ridges on the nutlets indicate that it may perhaps be better considered the type of a new group.

C. S. S.

EXPLANATION OF THE PLATE.

Plate LIV. Cratægus insignis.

1. Part of a flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit showing the nutlets, enlarged.
6. A nutlet, ventral view, enlarged.
7. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS INSIGNIS, Sarg.

CRATÆGUS DISJUNCTA, SARG.

CRATÆGUS DISJUNCTA, *n. sp.*

Glabrous. Leaves broadly ovate, acuminate, full and rounded or concave-cuneate at the entire base, sharply and often doubly serrate above, with straight or incurved teeth tipped with small dark red glands, and slightly and irregularly divided above the middle into narrow acuminate spreading lobes; more than half grown when the flowers open and then very thin and smooth, dull blue-green above and pale yellow-green below; at maturity thin but firm in texture, dark blue-green on the upper surface, pale on the lower surface, from 7 to 8.5 centimetres long, from 5.5 to 7 centimetres wide, with slender dark yellow midribs and four or five pairs of thin primary veins extending obliquely to the points of the lobes; petioles slender, wing-margined at the apex, grooved, glandular, with minute scattered dark glands, from 2.5 to 3 centimetres in length; stipules linear, acuminate, glandular, caducous. Flowers about 1.6 centimetres in diameter, on long stout pedicels, in compact three to six, usually five-flowered compound corymbs; bracts and bractlets linear, acuminate, often falcate, conspicuously glandular, mostly deciduous before the flowers open; calyx-tube narrowly obconic, the lobes slender, acuminate, entire or rarely sparingly glandular on the margins, reflexed after anthesis; stamens ten; anthers large, rose color; styles four or five, surrounded at the base by a narrow ring of pale tomentum. Fruit on stout rigid pedicels, in few-fruited spreading or drooping clusters, subglobose, but usually rather broader than high, angled, green more or less tinged with red, pruinose, from 1.2 to 1.4 centimetres in diameter; calyx conspicuous, with a short tube, a narrow shallow cavity, and much enlarged spreading or erect lobes usually deciduous at midsummer; flesh thin, dry, and mealy, greenish yellow; nutlets usually four, thick, full, and rounded at the ends, deeply grooved on the back, about 8 millimetres long.

A tree, 4 or 5 metres in height, with a tall slender stem, small erect or spreading branches forming an open irregular head, and stout slightly zigzag branchlets dark olive-green tinged with red when they first appear, dark dull reddish brown or purple and marked by small pale lenticels at the end of their first season, becoming light grayish brown or gray in their second year, and armed by many stout nearly straight dark purple shining spines from 6 to 7 centimetres in length. Flowers during the first week of May.

Gravelly banks of small streams, Monteer, Missouri, *B. F. Bush*, July 26 and August 4, 1899 (Nos. 253 and 345), May 2 and 3, 1892 (Nos. 1488 and 1495).

Well distinguished from the other species of the Pruinosa Group with ten stamens, by its large, thin, broadly ovate leaves usually full and rounded at the base, and by its few-flowered compact corymbs.

C. S. S.

EXPLANATION OF THE PLATE.

Plate LV. Cratægus disjuncta.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit, enlarged.
6. Cross section of a fruit, enlarged.
7. A nutlet, side view, enlarged.
8. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS DISJUNCTA, Sarg.

CRATÆGUS BELLULA, SARG.

CRATÆGUS BELLULA, *n. sp.*

Glabrous with the exception of a few caducous hairs on the upper side of the unfolding leaves. Leaves ovate, acuminate, broadly cuneate, truncate or on leading shoots often cordate at the glandular base, sharply doubly serrate above, with straight glandular teeth, and deeply divided into four or five pairs of narrow acuminate spreading lateral lobes; more than half grown when the flowers open and then membranaceous, pale yellow-green, and glabrous; at maturity subcoriaceous, dark bluish green and very lustrous on the upper surface, pale blue-green on the lower surface, from 5 to 7 centimetres long, from 4 to 6 centimetres wide, with thin prominent pale yellow midribs deeply impressed on the upper side, and slender primary veins arching obliquely to the points of the lobes; petioles stout, narrowly wing-margined at the apex by the decurrent base of the leaf-blades, slightly grooved, glandular with numerous small dark red stipitate persistent glands, from 2 to 3 centimetres in length; stipules lunate to linear-falcate, lobed at the base, coarsely glandular-serrate, tinged with red, often large and conspicuous, mostly persistent until the flowers open. Flowers 1.6 centimetres in diameter on long slender pedicels, in lax usually five to seven-flowered compound corymbs; bracts and bractlets oblong-obovate to linear, glandular, reddish, usually persistent until after the petals have fallen; calyx-tube broadly obconic, the lobes small, separated by wide rounded sinuses, acuminate, entire or rarely sparingly glandular-serrate, reflexed after anthesis; stamens eight to ten, usually ten; anthers light rose color; styles two to five. Fruit on slender pedicels, in compact drooping clusters, subglobose and often somewhat broader than high, or broadly obovate, dull crimson, pruinose, marked by many small pale dots, from 1.5 to 1.8 centimetres in diameter; calyx sessile, with a narrow shallow cavity, and small erect lobes, their tips mostly deciduous from the ripe fruit; flesh thick, yellow, dry, and mealy; nutlets two to five, usually four, full and rounded at the apex, gradually narrowed and acute at the base, ridged on the back, with a high broad and grooved or narrow rounded ridge, about 7 millimetres long and often 6 millimetres wide.

A shrub, from 3 to 4 metres in height, and nearly as broad, with numerous stout intricately branched ascending stems and slender only slightly zigzag branchlets, bright orange-green when they first appear, bright red and lustrous and marked by occasional small dark lenticels at the end of their first season, becoming dark brown tinged with purple in their second year, and armed with many slender nearly straight bright red-brown shining spines often pointed toward the base of the branch, from 4 to 6 centimetres in length, long-persistent on the stems, and ultimately ashy gray. Flowers about the 20th of May. Fruit ripens from the middle of September to the beginning of October.

Grand Rapids, Michigan; common; *Miss E. J. Cole*, May and September, 1901 and 1902, *C. S. Sargent*, September, 1901.

This interesting addition to the Pruinosæ is one of the most beautiful of American Thorns, with its large and abundant flowers, its brilliant fruit, and lustrous and deeply divided leaves.

C. S. S.

EXPLANATION OF THE PLATE.

Plate LVI. Cratægus bellula.

1. Part of a flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, side view, enlarged.
7. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS BELLULA, Sarg.

CRATÆGUS LANUGINOSA, SARG.

CRATÆGUS LANUGINOSA, *n. sp.*

Leaves ovate to suborbicular, acute or rounded and short-pointed at the apex, broadly cuneate or rounded at the entire base, coarsely and sharply doubly serrate above, with glandular teeth, and often irregularly divided above the middle into short broad acute lateral lobes; less than half grown when the flowers open and then dark green and villose above and covered below with a thick coat of hoary tomentum; at maturity subcoriaceous, dark blue-green, lustrous and scabrate on the upper surface, yellow-green and tomentose on the lower surface, from 4 to 5 centimetres long, from 2.5 to 4 centimetres wide, with stout midribs and three to five pairs of prominent primary veins extending obliquely to the points of the lobes; petioles stout, slightly grooved, thickly covered with tomentum, from 1 to 1.5 centimetres in length; stipules foliaceous, oblong, acute, glandular, with minute red glands, villose, caducous; on vigorous shoots leaves often broadly ovate, very coarsely glandular-serrate, rounded or truncate at the base, and frequently 8 centimetres long and broad, their stipules lunate, coarsely serrate, subcoriaceous, from 1 to 1.5 centimetres long. Flowers 2 centimetres in diameter, in compact many-flowered compound hoary-tomentose corymbs; bracts and bractlets oblong-obovate, acute or rounded at the apex, finely glandular-serrate, villose, large and conspicuous, persistent until after the flowers have opened; calyx-tube broadly obconic, thickly covered like the short stout pedicel with long matted pale hairs, the lobes short, broad, acuminate, glandular, with minute stipitate glands, densely villose on the outer, slightly villose on the inner surface; stamens twenty; anthers rose color; styles five, surrounded at the base by large tufts of snow-white hairs. Fruit on short tomentose erect pedicels, in few-fruited clusters, subglobose to short-oblong, full and rounded and slightly hairy at the ends, dark crimson, marked by occasional large pale dots, from 1 to 1.2 centimetres in diameter; calyx enlarged, sessile, with a broad deep cavity and villose coarsely serrate usually erect and spreading or incurved persistent lobes, bright red on the upper side near the base; flesh thin, orange color, dry, and mealy; nutlets five, thin, acute at the ends, rounded and very irregularly ridged on the back, about 6 millimetres long.

In moist rich soil a bushy tree, sometimes 8 metres in height, with a stout trunk covered with pale bark and spreading and erect branches, or on dry hillsides a round-topped shrub 2 or 3 metres tall; branchlets stout, zigzag, light green and villose when they first appear, dull red-brown and sparingly villose or pubescent at the end of their first year, becoming dark or light gray-brown in their second season, and horribly armed with many long stout straight purple shining ultimately ashy gray spines from 3 to 9, but usually about 7, centimetres in length. Flowers during the last week of April. Fruit ripens the end of October.

Near Webb City, Missouri; common; *B. F. Bush*, May, 1901, *E. J. Palmer*, October, 1901, April and October, 1902; *Trelease and Sargent*, October, 1901.

Cratægus lanuginosa is readily distinguished from the other species of the Mollis Group by the distinctly blue color of the leaves. The small leaves, dark crimson hard fruits, and the remarkable development of the spines are also unusual in this group.

C. S. S.

EXPLANATION OF THE PLATE.

Plate LVII. Cratægus lanuginosa.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit showing the nutlets, enlarged.
6. A nutlet, ventral view, enlarged.
7. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS LANUGINOSA, Sarg.

CRATÆGUS INDUTA, SARG.

CRATÆGUS INDUTA, *n. sp.*

Leaves oblong-ovate, acute, cuneate, rounded or rarely truncate at the broad entire base, very coarsely doubly serrate above, with glandular teeth, and slightly and irregularly divided into broad acute lateral lobes; about one third grown when the flowers open and then thin, light yellow-green and roughened above by short lustrous white hairs and coated below with hoary tomentum; at maturity thin, dark yellow-green and scabrate on the upper surface, pale, tomentose or pubescent below, particularly along the stout midribs and four or five pairs of prominent primary veins, from 8 to 10 centimetres long, from 6 to 9 centimetres wide; petioles slender, more or less wing-margined at the apex, glandular, hoary-tomentose while young, becoming sparingly villose in the autumn, from 3 to 4 centimetres in length; stipules linear to linear-oblong, acuminate, glandular-serrate, with dark glands, villose, often lobed and reddish at the base. Flowers 2 centimetres in diameter, in broad many-flowered thin-branched hoary tomentose compound corymbs; bracts and bractlets oblong-obovate to linear, acuminate, glandular, villose, reflexed after anthesis; calyx-tube narrowly obconic, covered like the stout elongated pedicels with a thick coat of long densely matted white hairs, the lobes small, acuminate, glandular-serrate, villose, reflexed after anthesis; stamens twenty; anthers small, rose color; styles five, surrounded at the base by a broad ring of snow-white hairs. Fruit on stout reddish villose pedicels, in few-fruited clusters, short-oblong, full and rounded and villose at the ends, crimson or reddish yellow, lustrous, marked by small pale dots, from 2 to 2.5 centimetres in diameter; calyx prominent, with a short tomentose tube, a broad deep cavity, and much enlarged coarsely glandular-serrate hairy erect and incurved lobes often deciduous from the ripe fruit; flesh thick, orange color, with an astringent subacid flavor; nutlets five, thin, acute at the ends, rounded and slightly grooved on the back, 7 to 8 millimetres in length.

A tree, 7 or 8 metres in height, with a trunk often 3 decimetres in diameter covered with thick dark brown furrowed bark, large spreading and ascending branches forming an open irregular head, and stout zigzag branchlets covered when they first appear with long matted white hairs, light orange-brown, lustrous, puberulous and marked by few small pale lenticels at the end of their first season, becoming ashy gray or light grayish brown the following year, and armed with very numerous stout nearly straight dark purple shining spines usually about 6 centimetres long. Flowers from the middle to the end of April. Fruit ripens the middle of October.

Dry upland woods, Red River valley, near Fulton, Arkansas; common; *B. F. Bush*, April, August, and October, 1901, April, 1902, *Canby and Sargent*, April, 1901.

This handsome species of the Mollis Group which, unlike most of the species of this group, grows in dry upland woods, is well distinguished by the form of the very slightly lobed leaves and by the large and late-ripening fruits, which are edible, and are called turkey apples by the negroes.

C. S. S.

EXPLANATION OF THE PLATE.

Plate LVIII. Cratægus induta.

1. Part of a flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit showing the nutlets, enlarged.
6. A nutlet, side view, enlarged.
7. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS INDUTA, Sarg.

CRATÆGUS KELLOGGII.

CRATÆGUS KELLOGGII, *n. sp.*

Leaves broadly ovate to suborbicular, rounded and often short-pointed at the apex, rounded, broadly cuneate or truncate at the entire base, coarsely serrate above, with straight gland-tipped teeth, and divided usually only above the middle into several short broad acute or acuminate lobes; about half grown when the flowers open, and then very thin, yellow-green, covered above with short pale hairs and pubescent below along the midribs and veins; at maturity thin but firm in texture, dark yellow-green, glabrous and smooth on the upper surface, paler and glabrous on the lower surface with the exception of a few hairs near the base of the thin yellow midribs and of the four or five pairs of slender prominent primary veins arching obliquely to the points of the lobes, from 5 to 6.5 centimetres long, from 4.5 to 6.5 centimetres broad, often broader than long; petioles slender, slightly winged at the apex, grooved, villose while young, with long matted white hairs, becoming glabrous, from 2 to 4 centimetres in length; stipules linear to linear-obovate, acuminate, glandular, turning reddish in fading, caducous. Flowers about 1.6 centimetres in diameter on slender hairy pedicels, in compact five to ten-flowered villose compound corymbs; bracts and bractlets oblong-obovate to linear, acuminate, glandular, mostly persistent until the flowers open; calyx-tube broadly obconic, the lobes slender, acuminate, glandular, with minute dark red stipitate glands, or entire, glabrous on the outer, sparingly villose on the inner surface; stamens twenty; anthers pale rose color; styles five. Fruit drooping on long slender glabrous pedicels, subglobose to short-ovate, bright yellow, marked by many small pale lenticels, from 2 to 2.5 centimetres in diameter; calyx small, with a narrow shallow cavity, and spreading reflexed lobes slightly villose toward the apex and often deciduous from the ripe fruit; flesh thin, yellow, dry, and mealy; nutlets five, acute at the ends, rounded and very slightly grooved on the back, about 8 millimetres long and 6 millimetres high.

A tree, 6 or 7 metres in height, with a tall trunk about 1 decimetre in diameter, covered with nearly black deeply furrowed bark, erect branches, and slender nearly straight branchlets dark green tinged with red and slightly villose when they first appear, bright red-brown, lustrous, and marked by many small pale lenticels at the end of their first season, becoming dark dull reddish brown the following year, and unarmed or armed with slender nearly straight bright chestnut-brown shining spines usually about 3 centimetres in length. Flowers the last week of April. Fruit ripens toward the end of September and soon falls.

Mouth of the Despères River, St. Louis, Missouri; rare; *John H. Kellogg*, April and September, 1902.

Cratægus Kelloggii, which is named for its discoverer, appears to have more affinity with the species of the Mollis Group than with those of any of the other described groups. It differs, however, from the Mollis species in its smaller leaves, which are only slightly hairy even when young, in its smaller flowers, and in the sparingly villose corymbs and calyx-tube. The bright yellow fruit is also unusual.

C. S. S.

EXPLANATION OF THE PLATE.

Plate LIX. Cratægus Kelloggii.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit showing the nutlets, enlarged.
6. A nutlet, side view, enlarged.
7. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS KELLOGGII, Sarg.

CRATÆGUS FAXONI, SARG.

CRATÆGUS FAXONI, Sargent, *Rhodora*, v. 161 (1903).

Leaves broadly ovate to suborbicular or rarely oval, rounded or short-pointed and acuminate at the apex, rounded, truncate or cuneate at the usually broad entire often glandular base, finely serrate above, with straight or incurved teeth tipped with large dark glands, and slightly divided into four or five pairs of short acute or acuminate lobes; coated above until after the flowering time with long soft white hairs and densely hoary tomentose below; at maturity thin but firm in texture, dark dull green and glabrous on the upper surface, pale and glabrous on the lower surface, with the exception of a few hairs scattered along the stout midribs deeply impressed above and the prominent primary veins arching obliquely to the points of the lobes, from 4 to 5 centimetres long, from 3.5 to 4 centimetres wide, or on leading shoots sometimes 6 centimetres long and wide; petioles slender, grooved, often slightly winged at the apex by the decurrent base of the leaf-blades, villose at first, glandular, with minute dark red scattered glands, caducous except on vigorous shoots, glabrous in the autumn, from 2 to 2.5 centimetres in length; stipules linear to oblong-obovate, acute, finely glandular-serrate, villose, from 7 to 8 millimetres long, caducous. Flowers 1 centimetre in diameter on short stout hairy pedicels, in compact seven to nine-flowered densely villose compound corymbs; bracts and bractlets linear to oblong-obovate, acuminate, finely glandular-serrate, turning brown in fading, caducous; calyx-tube broadly obconic, villose particularly toward the base, the lobes gradually narrowed, slender, slightly villose, glandular-serrate; stamens five to ten, usually five; anthers pale yellow; styles three or four. Fruit mostly erect on stout glabrous or slightly hairy pedicels, in few-fruited clusters, oblong, full and rounded at the ends, dark crimson, lustrous, marked by few large pale dots, from 1 to 1.2 centimetres long and from 8 to 10 millimetres wide; calyx small, with a narrow deep cavity and spreading reflexed villose lobes, the tips mostly deciduous from the ripe fruit; flesh thin, yellow, dry, and mealy; nutlets three or four, full and rounded at the ends, prominently ridged on the broad back, with a high rounded ridge, from 8 to 9 millimetres in length.

A shrub, from 3 to 3.5 metres in height, with numerous stout spreading stems forming a broad round-topped handsome head, and slender nearly straight branchlets coated at first with long matted pale hairs, soon becoming glabrous, light red-brown and marked by occasional large pale lenticels during their first season, and dark gray-brown the following year, and armed with slender slightly curved light chestnut-brown shining spines from 4 to 4.5 centimetres in length. Flowers from the 20th to the end of May. Fruit ripens at the end of September.

River banks and open rocky pastures, Franconia, New Hampshire, *C. E. Faxon*, September, 1890, 1899, 1900, and May, 1901.

This species is named for my associate, Charles Edward Faxon, who first noticed its distinct characters.

C. S. S.

EXPLANATION OF THE PLATE.

Plate LX. Cratægus Faxoni.

1. Part of a flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, side view, enlarged.
7. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS FAXONI, Sarg.

TILIA MONGOLICA, MAXIM.

TILIA MONGOLICA, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 433 (1880); *Mél. Biol.* x. 585; *Enum. Pl. Mong.* 118, t. 11. — Franchet, *Nouv. Arch. Mus. Paris*, sér. 2, v. 60 (*Pl. David.* i.). — Palibin, *Act. Hort. Petrop.* xiv. 1. — Henry, *Rev. Hort.* 1902, 476, f. 214, 215, 217.

Leaves slender-petiolate, orbicular-ovate to ovate, from 4 to 6 centimetres long and from 3 to 4 centimetres broad, cuspidate, slightly oblique and truncate or subcordate at the base, coarsely serrate, with triangular acuminate teeth, and sometimes slightly three-lobed or lobed only on one side, glabrous, dark green above, glaucous beneath, with four to five pairs of veins, those of the basal pair ending the lateral lobes; petioles slender, from 1.5 to 2 centimetres long. Flowers yellowish white, fragrant, in six to twelve-flowered cymes; peduncles slender, from 2.5 to 3.5 centimetres in length; bract narrowly oblong, about 3 centimetres long, adnate in its lower third to the peduncle, short-pedunculate at the base, not exceeding the inflorescence; pedicels about as long as the flowers; sepals ovate-lanceolate, upright like the petals, villose on the inner side, glabrous on the outer side, about 6 millimetres long; petals narrowly oblong, about one third longer than the sepals; staminodes narrowly oblong, somewhat shorter than petals; stamens about as long as the sepals, disposed in five bundles, each with seven to eight stamens; style about as long as the petals, glabrous, with a short five-parted stigma; ovary finely tomentulose, five-celled. Fruit ovoid or oblong-ovoid, from 6 to 8 millimetres long, mucronulate, without ribs or only slightly ribbed, thick-walled, sparingly tomentulose, usually one or two-seeded.

A small or, according to David, a medium-sized tree (in cultivation to 6 metres high), with slender spreading branches; branchlets like the young unfolding leaves purplish and glabrous, becoming at the end of the first year yellowish purple or brownish purple, older branches with light gray bark finally longitudinally fissured; winter-buds subglobose, small, glabrous. Flowers appearing in July. Fruit ripens in October.

Tilia Mongolica is very distinct in appearance with its small coarsely serrate leaves resembling those of a Birch-tree. It is most nearly related to *Tilia Sibirica*, Bayer,[1] and *Tilia Japonica*, Miquel, but differs from both in the coarser serration of the leaves, which are without the tufts of hairs on the lower surface in the axils of the veins, the upright sepals and petals, and from *Tilia Sibirica* also by the presence of staminodes.

Tilia Mongolica was introduced into the Arnold Arboretum in 1882, when seeds collected on the Pohuashan Mountains near Pekin were received from Dr. Bretschneider. It has proved perfectly hardy and forms a graceful little tree very distinct in its appearance from the other Lindens. The purple tint of the unfolding leaves is noticeable in this tree.

ALFRED REHDER.

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[1] *Tilia Sibirica*, Bayer, *Zool. Bot. Ges. Wien*, xii. 23 (1862).

Tilia cordata, Ruprecht & Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xv. 412 (not Miller) (1857). — Maximowicz, *Mém. Sav. Étr. Acad. Sci. St. Pétersbourg*, ix. 62 (*Prim. Fl. Amur.*). — Simonkai, *Math. Term. Közl. Mag. Tudom. Akad.* xxii. 327 (*Rev. Til. Hung. Orb. Terr.*).

Tilia cordata, var. *Mandshurica*, var. *Sibirica*, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 433 (1880); *Mél. Biol.* x. 584.

Tilia Amurensis, Borbás, *Bot. Centralb.* xxxvii. 164 (1889).

Tilia Maximowiczii, Baker, *Jour. Bot.* xxxvi. 319 (1898).

Borbás quotes "Ruprecht" as authority for *Tilia Amurensis* without further reference. If Ruprecht had really published this name it would probably be the oldest, but I have been unable to find it in Ruprecht's papers on the flora of the Amurland, nor have I found any other reference to the name besides the citation of Borbás.

EXPLANATION OF THE PLATE.

Plate LXI. Tilia Mongolica.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A sepal, enlarged.
4. A petal, enlarged.
5. A staminode with a bundle of stamens, enlarged.
6. A pistil, enlarged.
7. A fruiting branch, natural size.
8. A fruit divided transversely, enlarged.

C. E. Faxon del.

TILIA MONGOLICA, Maxim.

EVONYMUS SIEBOLDIANUS, Bl.

Evonymus Sieboldianus, Blume, *Bijdr. Fl. Ned. Ind.* 1147 (1826).— Siebold & Zuccarini, *Abhand. Akad. Münch.* iv. pt. 2, 151. — Fr. Schmidt, *Mém. Acad. Sci. St. Pétersbourg*, sér. 7, xii. No. 2, 122 (*Fl. Sachalinensis*). — Franchet & Savatier, *Enum. Pl. Jap.* i. 79 ; ii. 312. — Koehne, *Deutsche Dendr.* 365.

Evonymus Europæus, Thunberg, *Fl. Jap.* 101 (not Linnæus) (1784).

Evonymus Majumi, Siebold, *Syn. Pl. Œcon.* No. 267 (ex Maximowicz) (1830).

Evonymus Vidalii, Franchet & Savatier, *Enum. Pl. Jap.* ii. 312 (1879).

Leaves deciduous, petiolate, oval or elliptic to oblong, rarely obovate, from 6 to 12 centimetres long and from 2.5 to 7 centimetres broad, abruptly and shortly acuminate, broadly cuneate or sometimes almost rounded at the base, finely serrulate or crenately serrulate, with incurved mucronulate teeth, dark green and glabrous above except the puberulous veins, paler beneath and finely pubescent on the veins ; petioles rather stout, grooved above, from 0.5 to 1.5 centimetres long, usually puberulous when young, glabrous at maturity. Flowers 4-merous, andro-diœcious, greenish white, in rather loose glabrous many-flowered cymes twice to thrice dichotomous ; peduncles from 2 to 4 centimetres in length ; pedicels from 3 to 4 millimetres long ; sepals suborbicular, about one third as long as the oval to elliptic obtuse petals ; stamens about as long as the sepals, with short filaments and purple suborbicular anthers ; ovary conical ; style exceeding the stamens ; stigma indistinctly lobed ; ovules ascending ; perfect flowers from 7 to 8 millimetres across ; the staminate, from 10 to 12 millimetres in diameter, their stamens with filaments about 2 millimetres long and exceeding the short rudimentary style. Capsule broadly obovate or obconical, four-lobed and four-angled, the lobes keeled on the back, about 1 centimetre in diameter, narrowed at the base, slightly concave at the apex, crowned by the persistent style, pink, smooth, glabrous or sometimes puberulous ; seeds light reddish brown, purple at the small opening left by the orange-red arillus, the radicle inferior.

A shrub or small tree, reaching 8 metres in height, with upright and spreading branches ; young branchlets green or purple, indistinctly four-angled or nearly terete, becoming purplish or yellowish brown the second year and yellowish or orange-gray the third, finally changing to gray ; bark of the trunk dark gray, prominently ridged ; winter-buds globose-ovate, the terminal ones about 5 millimetres long, and nearly as thick, glabrous, with about four pairs of outer grayish green sparingly ciliate scales. Flowers appear in June. Fruit ripens in September.

Japan : Hokkaido, Hakodate, *C. Wright*, 1853–56, *Miyabe and Tokubuchi*, July 10, 1890, Sapparo, *Tokubuchi*, July 14, 1887, and October, 1890, *C. S. Sargent*, September 22, 1892, Horomui, *Miyabe*, July 13, 1885 ; Hondo, Miyanoshita, *C. S. Sargent*, August 25, 1892, road from Nikko to Lake Chuzenji, *C. S. Sargent*, November 3, 1892, road from Atami to Odawara, *C. S. Sargent*, August 28, 1897. Corea : Tsu-sima Island, *C. Wilford*. According to Maximowicz,[1] who refers this species to *Evonymus Europæus*, var. *Hamiltonianus*, it occurs also in Kiusiu, and Fr. Schmidt reports a low-growing form in Saghalin.

Evonymus Sieboldianus is most nearly related to *Evonymus Hamiltonianus*, Wallich, and differs from it chiefly in its four-angled obconical capsule, the larger and broader leaves more sharply and closely serrate, and in the pubescence on the lower side of their veins.

[1] *Bull. Acad. Sci. St. Pétersbourg*, xxvii. 451 ; *Mél. Biol.* xi. 193.

Evonymus Sieboldianus has been cultivated at the Arnold Arboretum for almost twenty years, having been received in 1884 from the nursery of the S. B. Parsons Company at Flushing, New York, under the name of Evonymus spec. Japan and spec. Yeddo. It is also found in some European gardens under the name *Evonymus Yeddoensis*, Hort. At the Arnold Arboretum it has proved perfectly hardy and forms a handsome shrub with large dark green foliage and attractive pink fruits.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE LXII. EVONYMUS SIEBOLDIANUS.

1. A flowering branch, natural size.
2. A perfect flower, enlarged.
3. A staminate flower, enlarged.
4. A stamen, front and rear views, enlarged.
5. A fruiting branch, natural size.
6. Vertical section of a fruit, enlarged.
7. Cross section of a fruit, enlarged.

C. E. Faxon del.

EVONYMUS SIEBOLDIANUS, Bl.

EVONYMUS BUNGEANUS, MAXIM.

EVONYMUS BUNGEANUS, Maximowicz, *Mém. Sav. Étr. Acad. Sci. St. Pétersbourg*, ix. 470 (*Prim. Fl. Amur.*) (1859); *Bull. Acad. Sci. St. Pétersbourg*, xxvii. 448; *Mél. Biol.* xi. 188. — Walpers, *Ann.* vii. 574. — Hance, *Jour. Linn. Soc.* xiii. 77. — Baker & Moore, *Jour. Linn. Soc.* xvii. 380. — Franchet, *Nouv. Arch. Mus. Paris*, sér. 2, v. 69 (*Pl. David.* i.); *Mém. Soc. Nat. Cherbourg*, xxiv. 206. — Debeaux, *Act. Soc. Linn. Bordeaux*, xxx. 75; *Fl. Shangh.* 23. — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 118. — Dippel, *Handb. Laubholzk.* ii. 488, f. 233. — Koehne, *Deutsche Dendr.* 365. — Loesener, *Engler Bot. Jahrb.* xxx. 461.

EVONYMUS MICRANTHUS, Bunge, *Mém. Sav. Étr. Acad. Sci. St. Pétersbourg*, ii. 88 (*Enum. Pl. Chin. Bor.*) (not Don) (1833).

EVONYMUS FORBESII, Hance, *Jour. Bot.* xviii. 259 (1880).

Leaves deciduous, slender-petiolate, ovate or oval to elliptic-ovate, from 4 to 8 centimetres long and from 1.5 to 3.5 centimetres broad, long acuminate, cuneate at the base, finely and often crenately serrulate, with incurved mucronulate teeth, glabrous, bright green with a bluish or grayish hue; petioles grooved above, from 1 to 1.5, rarely to 2 centimetres in length. Flowers 4-merous, from 7 to 8 millimetres across, yellowish white, in loose three to seven-flowered slender stalked glabrous cymes appearing at the base of the branches in the axils of deciduous bracts and often of the lowest pair of leaves; peduncle 1.5 to 2 centimetres long; pedicels from 4 to 5 millimetres in length; sepals suborbicular, scarcely half as long as the oval spreading petals; stamens inserted below the slightly lobed disk, scarcely half as long as the petals, with very short filaments and suborbicular purple anthers; ovary conical, with a short style; ovules ascending. Capsule depressed-globose, four-lobed, smooth, rounded at the base, with a persistent style at the slightly concave apex, about 1 centimetre in diameter, pale greenish yellow, the fertile cells with rounded backs, the sterile ones slightly keeled; seed yellowish or purplish, wholly inclosed by an orange-red arillus, radicle inferior.

A large glabrous shrub or small tree, from 3 to 5 metres high, with upright branches and numerous lateral spreading branchlets; young branchlets indistinctly four-angled or nearly terete, becoming grayish or purplish green the second year; older branches gray; bark of the trunk gray, deeply fissured, its ridges finally broken into thin scales; winter-buds small, the terminal ovate, from 3 to 4 millimetres long, with three to four pairs of outer imbricate scales, light greenish brown and tinged with purple, ciliate. Flowers in June. Fruit ripens in October.

From Turkestan through Mongolia and north China to Manchuria.

Evonymus Bungeanus is most nearly related to the Himalayan *Evonymus Hamiltonianus*, Wallich, differing from it in its smaller slender-petiolate and long-acuminate leaves and in their bluish green hue.

Evonymus Bungeanus has been in cultivation at the Arnold Arboretum since 1888, when it was received from the nursery of L. Späth, Rixdorf, near Berlin, and has proved perfectly hardy. It is a handsome shrub with graceful bluish green foliage and ornamental fruits which appear in great profusion and remain on the branches long after the leaves have fallen.[1]

ALFRED REHDER.

Arnold Arboretum.

[1] Rehder, *Möller's Deutsche Gärtn.-Zeit.* xiv. 569, fig.

EXPLANATION OF THE PLATE.

Plate LXIII. Evonymus Bungeanus.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A stamen, front and rear views, enlarged.
4. A fruiting branch, natural size.

5 and 6. Vertical sections of fruits, enlarged.

C. E. Faxon del.

EVONYMUS BUNGEANUS, Maxim.

EVONYMUS PATENS, REHD.

EVONYMUS PATENS, *n. sp.*

Leaves semipersistent, chartaceous, elliptic to elliptic-oblong, rarely obovate or obovate-oblong, from 5 to 8 centimetres long and from 2 to 4 centimetres broad, acute, rarely slightly acuminate, cuneate at the base, crenately serrulate, glabrous, bright green above, pale beneath, with five or six pairs of veins prominent above, less prominent beneath; petioles about 5 millimetres in length. Flowers 4-merous, greenish white, from 8 to 10 millimetres across, in upright loose long-stalked cymes, two to four times dichotomous; peduncles from 2.5 to 4 centimetres long; pedicels slender, from 6 to 8 millimetres in length; sepals semiorbiculate, about one third as long as the suborbicular petals; stamens inserted below the four-angled reddish disk, about one half or two thirds as long as the petals; style about as long as the stamens, with a more or less distinctly four-lobed stigma; ovules pendulous. Fruiting cymes upright or spreading, many-fruited, loose, from 5 to 6 centimetres in diameter, with wide-spreading ramifications; capsule subglobose, not lobed, smooth, about 1 centimetre across, pink; seed light pinkish brown, entirely enveloped by the orange-red arillus; radicle superior.

A glabrous shrub with spreading branches, from 0.5 to 3 metres in height, the lower branches sometimes procumbent at the base and rooting; young branchlets obscurely four-angled, grayish green, minutely verruculose, becoming greenish the second year and gradually changing to gray after the third year; bark of old stems gray and slightly fissured; winter-buds ovate, the terminal from 5 to 10 millimetres long, grayish green, with three or four pairs of outer ciliolate scales. Flowers in August and September. Fruit ripens in October and November.

Probably a native of China, whence it was introduced into the United States about forty years ago by Dr. George R. Hall, who, previous to 1860, resided for several years at Shanghai.

Evonymus patens is allied to *Evonymus Japonicus*, Linnæus f., *Evonymus Tanakae*, Maximowicz, *Evonymus Chinensis*, Lindley, *Evonymus hederaceus*, Champion, *Evonymus flavescens*, Loesener, *Evonymus Kiautschovicus*, Loesener, and *Evonymus Hupehensis*, Loesener. *Evonymus Japonicus* differs in its coriaceous obtusish and more coarsely serrate leaves, less spreading inflorescence, and upright habit; *Evonymus Tanakae* in its winged fruits and leaves similar to those of *Evonymus Japonicus*; *Evonymus Chinensis* in its coriaceous entire leaves, smaller inflorescence, and four-angled branches; *Evonymus hederaceus* in its four-angled branches and short-stalked small inflorescence; *Evonymus flavescens* in its smaller abruptly acuminate obovate leaves; *Evonymus Kiautschovicus* in its smaller broadly oblong-obovate and shortly acuminate leaves, exceeded by the inflorescence; *Evonymus Hupehensis*, to which *Evonymus patens* seems more closely related, differs in its smaller dense inflorescence and acuminate more coriaceous leaves.

The specific name patens is given to this species in allusion to the widely spreading inflorescence and to the spreading habit of the whole plant.

Evonymus patens is cultivated in American gardens usually under the incorrect name of *Evonymus Sieboldianus*,[1] and is hardy as far north as Boston, where, however, the fruit but rarely ripens and the shrub occasionally suffers in severe winters. In the middle and southern Atlantic states, however, *Evonymus patens* is among the best shrubs for winter decoration on account of the very abundant late-ripening fruits and the handsome foliage which remains on the branches until spring except when it is destroyed by severe frost.

ALFRED REHDER.

Arnold Arboretum.

[1] Besides the true *Evonymus Sieboldianus*, Blume, and *Evonymus patens*, there is still another plant which is sometimes cultivated under the name of *Evonymus Sieboldianus*. It was sent under this name to the Arnold Arboretum in 1889 from the Botanic Garden at Kew, and is apparently closely related to *Evonymus Hamiltonianus*, Wallich, to which species I have referred it as var. *semipersistens* (Bailey, *Cycl. Am. Hort.* ii. 559 [1900]). It differs from the type chiefly in its half evergreen leaves generally oval to elliptic and rather abruptly acuminate, the bright green young branchlets, and the late-ripening pale greenish yellow fruits which are produced but sparingly, at least in the Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE LXIV. EVONYMUS PATENS.

1. A flowering branch, natural size.
2. A flower-bud, enlarged.
3. A flower, enlarged.
4. A stamen, front and rear views, enlarged.
5. A fruiting branch, natural size.
6. Vertical section of a fruit, enlarged.

C. E. Faxon del.

EVONYMUS PATENS, Rehd.

EVONYMUS RADICANS, MIQUEL.

EVONYMUS RADICANS, Miquel, *Ann. Mus. Lugd. Bat.* iii. 202 (1867); *Prol. Fl. Jap.* 366.[1]— Franchet & Savatier, *Enum. Pl. Jap.* i. 79 (1875). — Nicholson, *Hand-list Kew Arb.* i. 67. — Mouillefert, *Traité Arb. Arbriss.* ii. 752. — Rehder, *Bailey Cycl. Am. Hort.* ii. 559.

EVONYMUS JAPONICUS, var. RADICANS, Miquel, *Ann. Mus. Lugd. Bat.* ii. 86 (1865–66); *Prol. Fl. Jap.*18. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvii. 441; *Mél. Biol.* xi. 178. — Dippel, *Handb. Laubholzk.* ii. 495.

EVONYMUS RADICANS VIRIDIS, Regel, *Ind. Sem. Hort. Petrop.* 1866, 103 (1867).

EVONYMUS JAPONICUS, var. GRACILIS, Dippel, *Handb. Laubholzk.* ii. 495. — Koehne, *Deutsche Dendr.* 363 (1893).

Leaves persistent, coriaceous, short-petiolate, broadly ovate or oval to elliptic-oblong, from 2 to 5 centimetres long, narrowed or rounded at the ends, crenately serrulate, dull dark green or bluish green above, often marked with whitish veins, pale green beneath and very indistinctly veined. Flowers 4-merous, greenish white, from 6 to 7 millimetres across, in long-peduncled rather dense seven to fifteen-flowered cymes; peduncle generally 2 centimetres long, upright; pedicels from 2 to 4 millimetres in length; sepals semiorbicular, scarcely half as long as the suborbicular petals; stamens about half as long as the petals, with yellow subglobose anthers; ovary conical and with the style nearly as long as the petals; stigma obscurely three or four-lobed; ovules pendulous. Fruiting cymes nodding; capsule depressed-subglobose, not lobed or obscurely three to four-lobed, from 7 to 10 millimetres in diameter, greenish white or pinkish; seed yellowish white, wholly inclosed by the orange arillus; radicle superior.

A glabrous high-climbing or low and spreading shrub, with the lower branches usually procumbent and rooting; young branchlets grayish green, minutely verruculose, obscurely four-angled or nearly terete, becoming green the second year and changing after the third year gradually to grayish brown; old branches slightly fissured; winter-buds ovate, glabrous, with from four to six pairs of outer sparingly ciliolate scales. Flowers appear in June. Fruit ripens in October.

Japan, from Hokkaido to Kiu-siu.

A variable species,[2] most nearly related to *Evonymus Japonicus*, Linnæus f., from which it differs chiefly by its climbing or low spreading habit, the smaller, denser, and shorter-stalked inflorescence, the more densely crenate-serrulate, not remotely crenate leaves, the obscure venation on the under side of the leaves, and the less distinctly apiculate anthers. One of the most distinct of the forms is:

var. VEGETUS, Rehd.

EVONYMUS RADICANS, var. VEGETUS, *n. var.*

[1] As authority for the name "Siebold herb." is quoted by Miquel. *Evonymus gracilis*, Siebold, is, according to Regel, the form now called *Evonymus radicans*, var. *reticulatus*, while *Evonymus Japonicus*, var. *gracilis*, Regel, is one of the variegated forms.

[2] Another of the most distinct forms is *Evonymus radicans*, var. *Carrierei*, Nicholson, *Hand-list Kew Arb.* i. 67 (1894) (*Evonymus Carrierei*, Vauvel, *Vulgaris. d'Hort.* 1881, No. 6, ex Carrière, *Rev. Hort.* 1881, 373. — Carrière, *Rev. Hort.* 1885, 295, f. 50. — *Evonymus Japonicus*, var. *Carrierei*, Mottet, *Dict. Hort. Jard.* ii. 351. — *Evonymus Japonicus*, var. *gracilis*, Dippel, *Handb. Laubholzk.* ii. 495, in part). This variety differs from the type in its oval or ovate-elliptic to elliptic-oblong leaves, lustrous and bright green on the upper surface, and by its shrubby habit; it is a low depressed shrub with slender spreading branches, sometimes procumbent but not creeping. There are also a number of garden forms with variegated leaves, of which the following were first described by Regel in 1867, in the *Index Seminum Hort. Bot. Petrop.* for 1866 as varieties of *Evonymus Japonicus*; *Evonymus Japonicus*, var. *gracilis*, Regel (*Evonymus radicans*, var. *argenteo-marginatus*, Rehder, *Bailey Cycl. Am. Hort.* ii. 559). — *Evonymus Japonicus*, var. *radicans*, Regel (*Evonymus radicans*, var *roseo-marginatus*, Rehder, *l. c.*). — *Evonymus Japonicus*, var. *tricolor*, Regel. — *Evonymus Japonicus*, var. *reticulatus*, Regel (*Evonymus gracilis*, Hort. Siebold ex Regel. — *Evonymus radicans*, var. *reticulatus*, Rehder, *l. c.*).

Leaves broadly oval or almost suborbicular, from 3 to 4 centimetres long and from 2.5 to 3.5 centimetres broad, crenately serrulate, thickish, those of the rooting branches and young plants thinner, generally ovate, and about 2 centimetres long. Inflorescence equaling usually about two thirds of the leaf. Flowers and fruits appearing in great profusion; capsule greenish white, about 1 centimetre across; arillus bright orange.

A low-spreading shrub, from 0.5 to 1.5 metres in height, generally with a few procumbent rooting branches, bearing smaller ovate leaves, most of the branches stout, upright, or spreading; terminal winter-buds ovate, from 8 to 12 millimetres long.

Hokkaido, near Sapporo, *K. Miyabe* (October, 1889).

This variety differs from the type, which has the leaves generally elliptic-ovate to elliptic-oblong and narrowed at the ends, by its broadly oval or suborbicular obtuse leaves and shrubby habit, old plants showing little inclination to climb. It is one of the most ornamental and has proved the hardiest of the different forms of *Evonymus radicans* cultivated at the Arnold Arboretum, to which it was introduced in 1876 by Professor W. S. Clark, who collected seeds near Sapporo. The plants raised from these seeds, as well as plants raised afterward from seeds collected at the Arboretum, show that this variety is constant. It is especially beautiful in autumn, with its very abundant fruits covering the branches, and on account of its hardiness it can be recommended as a broad-leaved evergreen shrub for cold regions.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE LXV. EVONYMUS RADICANS, var. VEGETUS.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, enlarged.
5. A seed, enlarged.
6. Vertical section of a seed, enlarged.
7. A seedling, natural size.
8. A branch with roots, natural size.

C. E. Faxon del.

EVONYMUS RADICANS var. VEGETUS, Rehd.

ACER ARGUTUM, MAXIM.

ACER ARGUTUM, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xii. 226 (November, 1867); xxvi. 439; *Mél. Biol.* vi. 368; x. 594.— Miquel, *Archiv. Néerl.* ii. 475 (December, 1867).[1]—Franchet & Savatier, *Enum. Pl. Jap.* i. 91.—Nicholson, *Gard. Chron.* n. ser. xv. 725, f. 132.—Pax, *Engler Bot. Jahrb.* vii. 252; xvi. 404; *Engler Pflanzenreich*, 8 Heft. (iv. 163), 72.—Dippel, *Handb. Laubholzk.* ii. 413, f. 191[2]; *Bot. Zeit.* li. 211.—Koehne, *Deutsche Dendr.* 383.—Shirasawa, *Icon. Ess. For. Jap.* i. 112, t. 69.

ACER DIABOLICUM, subspec. ARGUTUM, Wesmael, *Bull. Soc. Bot. Belg.* xxix. 63 (1890).

Leaves deciduous, long-petiolate, five or rarely seven-lobed, from 6 to 8, rarely to 10 centimetres long, and about as broad, cordate with an open sinus or subcordate; lobes ovate or triangular-ovate, the lower much smaller than the others, long-acuminate, sharply or doubly serrate, with somewhat incurved acutish teeth; while young bright green above and short-pubescent on the veins and pale green beneath and grayish pubescent chiefly on the veins, with tufts of hairs in their axils, glabrascent at maturity; petioles slender, from 2 to 6 centimetres in length, pubescent while young, ultimately glabrous. Flowers dicœcious, pale yellowish green, in nodding racemes furnished with small caducous bracts, the main axis pubescent; pedicels glabrous, sepals and petals four upright, about 4 millimetres long; racemes of staminate flowers short, from 1 to 2 centimetres in length, five to eight-flowered, fascicle-like, lateral from axillary leafless buds; pedicels slender, from 5 to 8 millimetres in length; sepals elliptic, slightly exceeding the oblong-spatulate petals; disk inconspicuous, four-lobed, intrastaminal; stamens four,[3] exceeding the sepals by about one half of their length; anthers oval; racemes of pistillate flowers terminal on short lateral branchlets, peduncled, eight to fifteen-flowered, from 4 to 5 centimetres long; pedicels slender, from 8 to 12 millimetres long; sepals and petals similar to those of the staminate flowers but somewhat broader; styles shorter than the glabrous ovary; stigmas slender, about 2 millimetres long; disk small; rudimentary stamens present. Fruits on drooping pedunculate glabrous racemes, from 6 to 8 centimetres in length; nutlets but slightly compressed, elevated-reticulate, about 6 millimetres long, longer than broad, with the horizontally spreading wing from 1.8 to 2 centimetres long, the wing about 7 millimetres broad; embryo with conduplicate accumbent cotyledons.

A slender tree, from 5 to 7 metres in height, in cultivation usually shrubby; young branchlets pubescent, becoming glabrous or nearly so the second year, and purple or yellowish purple; bark

[1] The *Index Kewensis* gives as authority for *Acer argutum* "Maxim. ex Miquel in *Arch. Néerl.*" This would make Miquel the author of the species. Maximowicz's description, however, was published a month earlier than Miquel's, in vol. xii. of the *Bulletin* of the St. Petersburg Academy, dated November 13, 1867, while Miquel's description was published in No. 5 of vol. ii. of the *Archives Néerlandaises*, which could not have been issued before the beginning of December, as one of the articles, that of J. P. van Wickevoort Commelin, p. 44, preceding Miquel's paper, is dated December, 1867, the number itself being without date. *Acer capillipes*, *Acer circumlobatum*, *Acer barbinerve*, and *Acer Nikoense*, were also first published by Maximowicz in the same number of the *Bulletin*, and were described by Miquel apparently from herbarium specimens distributed previously by Maximowicz.

[2] Dippel's figure showing leaves only, which, according to Pax, are not those of this species, agrees exactly with the upper leaves on leading shoots of *Acer argutum;* the leaves produced at the ends of vigorous shoots differing in almost all species of Acer markedly from the ordinary leaves. Pax, therefore, is only right in so far as he calls it "eine wenig charakteristische Abbildung." (See Pax, *Engler Bot. Jahrb.* xvi. 404.—Dippel, *Bot. Zeit.* li. 211.)

[3] Pax gives the number of stamens as five, but I have found in two staminate specimens, including a type specimen, invariably four stamens and the same number of sepals and petals.

of the stem grayish brown, smooth, marked by horizontal lenticels. Winter-buds ovoid, obtuse, small, glabrous, covered by a pair of valvate purple scales, the second pair accrescent and leafy, puberulous, tinged with carmine. Flowers in spring with the unfolding of the leaves. Fruit ripens in September. The leaves turn yellow in the autumn.

Japan, Hondo: prov. Senano, *Tschonoski*, 1864 (type!), Nikko, ex herb. Science College Imp. Univ. Jap., April 24, 1882, *C. S. Sargent*, September 7, 1892.

Acer argutum is most closely related to *Acer barbinerve*, Maximowicz, which differs from it in its larger three to five-lobed more coarsely serrate leaves, the middle lobe much larger than the lateral lobes, the narrower sepals and petals, and the larger fruits. Both species, together with the allied but incompletely known *Acer tetramerum*, Pax, are placed by Pax in his section Lithocarpa, but this seems hardly natural considering the marked differences in the winter-buds, the folding of the embryo, the leafy pistillate inflorescences, the shape and serration of the leaves, the number of stamens, and the general habit. They seem to be much more closely related to the sections Glabra and Macrantha, and especially to *Acer Tschonoskii*, Maximowicz, and *Acer micranthum*, Siebold & Zuccarini, of the latter section, from which they differ only in the diœcious flowers and the staminate inflorescences being leafless and lateral. From *Acer glabrum*, Torrey, they differ besides in the diœcious flowers, in the folding of the embryo, the longer stamens, and in the pubescence.

Acer argutum was introduced into cultivation about twenty-five years ago by the Veitchian Nurseries, where it was first raised from seeds collected in Japan by Maries. At the Arnold Arboretum it has proved hardy and has produced flowers and fruits. It is a very handsome shrubby plant, with graceful light green foliage, and attractive in winter with its bright purple branches.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE LXVI. ACER ARGUTUM.

1. A branch with staminate flowers, natural size.
2. A staminate flower, enlarged.
3. A staminate flower seen from above, enlarged.
4. A sepal, enlarged.
5. A petal, enlarged.
6. A branch with pistillate flowers, natural size.
7. A pistillate flower, enlarged.
8. A pistil, enlarged.
9. A fruiting branch, natural size.
10. An embryo, enlarged.

C. E. Faxon del.

ACER ARGUTUM, Maxim.

ACER DIABOLICUM, K. KOCH.

ACER DIABOLICUM, K. Koch, *Ann. Mus. Lugd. Bat.* i. 251 (1863–64). — Miquel, *Ann. Mus. Lugd. Bat.* ii. 88; *Prol. Fl. Jap.* 20; *Arch. Néerl.* ii. 476. — Franchet & Savatier, *Enum. Pl. Jap.* i. 87; ii. 320. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 438; *Mél. Biol.* x. 593. — Nicholson, *Gard. Chron.* new ser. xv. 532, f. 100. — Pax, *Engler Bot. Jahrb.* vii. 251; *Engler Pflanzenreich*, 8 Heft (iv. 163), 71. — Dippel, *Handb. Laubholzk.* ii. 411, f. 189. — Koehne, *Deutsche Dendr.* 382. — Sargent, *Garden and Forest*, vi. 154; *Forest Fl. Jap.* 31.

Leaves long-petiolate, deciduous, five-lobed, from 10 to 12 centimetres long and broad, cordate or subcordate, rarely truncate at the base; lobes broadly ovate, acuminate, coarsely and remotely dentate-serrate, or crenately dentate, with broad acute or obtusish teeth, the middle lobe much larger and often slightly three-lobed, the basal lobes much smaller and usually with but one or two teeth on the outer margins; leaves when unfolding covered with long silky caducous hairs, at maturity chartaceous, ciliate, dark yellowish green and glabrous above, pale green beneath, sparingly pubescent, with short appressed hairs, longer and more loosely appressed on the veins; petioles slender, from 4 to 10 centimetres long, pubescent toward the apex. Flowers diœcious, appearing before the leaves from lateral buds, yellowish, in nodding fascicle-like racemes; the staminate in eight to ten-flowered pendulous racemes, short-peduncled or nearly sessile, the common axis from 5 to 10 millimetres long and the slender pilose or glabrate pedicels from 2 to 4 centimetres in length; perianth broadly campanulate, about 4 millimetres long, unequally four to eight-lobed, rarely divided partly or wholly to the base; stamens eight, inserted inside of the disk, about twice as long as the perianth; anthers oval; pistillate flowers in from five to seven-flowered nodding sessile or peduncled racemes, from 2 to 3 centimetres long, pilose or glabrous; pedicels from 5 to 10 millimetres long; sepals elliptic, obtuse, from 5 to 6 millimetres in length; petals oblong, of equal length; ovaries densely pubescent; style very short with two slender stigmas much exceeding the petals. Fruits yellowish or brownish in pendulous racemes; pedicels from 1 to 2, or the basal ones sometimes 5 centimetres long; nutlets scarcely compressed, cristate-reticulate, from 7 to 8 millimetres long and about as broad, furnished with setose yellowish hairs easily detachable, wings with the nutlet, from 3 to 4 centimetres long, nearly upright or slightly spreading, rarely somewhat incurved and overlapping, from 1 to 1.3 centimetres broad; cotyledons twice conduplicate and incumbent in the embryo, narrowly oblong, and about 2.5 centimetres long when fully grown.

A round-topped medium-sized tree, from 6 to 10 metres in height; young branchlets appressed-pubescent, becoming brown or reddish brown the second year and changing later to light grayish brown; bark of the trunk grayish brown, slightly fissured or nearly smooth; winter-buds ovate to oblong-ovate, acutish, dark brown, covered by six to eight pairs of outer finely pubescent scales; inner scales densely coated with yellowish hairs, the innermost accrescent and becoming leafy. Flowers in early spring before the leaves. Fruit ripens in October.

In the mountain woods of central Japan: Hondo, Nikko, ex herb. Science College, Imp. Univ. Jap., without date, *C. S. Sargent*, September 2 and November 3, 1892; Otama-Toga, Hakone Mountains, *C. S. Sargent*, August 26, 1892; without locality, *H. Mayr* (1886); Shikoku, Nanokawa, *K. Watanabe*, May 8, 1887, and June 20, 1889; Kiusiu, *U. Faurie* ex *Pax*.

Acer diabolicum [1] belongs to the section Lithocarpa of Pax, but differs from all other species of this section by the connate perianth of the staminate flowers, thus forming a transition toward the allied group of the Saccharina, where it has been placed by Koehne. I have been unable to find sufficient differences to separate *Acer purpurascens* of Franchet & Savatier from *Acer diabolicum*, none of the distinguishing characters given by authors appearing constant; it seems, therefore, best to consider it only as a slightly marked variety, differing only in the purple colors of the flowers, the darker color of the branches and fruits, and the autumnal colorings of the foliage, which is red in the variety, according to Shirasawa, while in the type the leaves change but little before falling.[2]

Acer diabolicum was introduced first into English gardens about twenty-five years ago by the Veitchian Nursery, which received seeds collected in Japan from C. Maries. The purple-flowered variety was sent in 1878 to the Arnold Arboretum from Monsieur Lavallé's Arboretum at Segrez under the name *Acer pulchrum*,[3] and flowered here for the first time in 1893. Both forms, the purple-flowered and the typical form, have proved perfectly hardy here. Though *Acer diabolicum* is less ornamental than many other Maples, it attracts attention by its large foliage, and the variety *purpurascens* is to be recommended for its early appearing purple flowers.

ALFRED REHDER.

Arnold Arboretum.

[1] "Blume in herb. Ludg. Bat." is quoted as authority for this name by Koch and Miquel.

[2] *Acer diabolicum*, var. *purpurascens*, var. nov.
Acer purpurascens, Franchet & Savatier, *Enum. Pl. Jap.* ii. 320 (1879). — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 439; *Mél. Biol.* x. 593. — Pax, *Engler Bot. Jahrb.* vii. 251; Engler, *Pflanzenreich*, 8 Heft (iv. 163), 71. — Shirasawa, *Icon. Ess. For. Jap.* i. 106, t. 65.

[3] *Acer pulchrum* "Maxim." Lavallé, *Arb. Segrez.* 29 (1877).

EXPLANATION OF THE PLATE.

PLATE LXVII. ACER DIABOLICUM.

1. A branch with staminate flowers, natural size.
2. A staminate flower with partly divided perianth, enlarged.
3. A staminate flower with connate perianth, enlarged.
4. Vertical section of a staminate flower, enlarged.
5. A branch with pistillate flowers, natural size.
6. Vertical section of a pistillate flower, enlarged.
7. A fruiting branch, natural size.
8. Vertical section of a nutlet, enlarged.
9. An embryo, enlarged.
10. A leaf, natural size.

C. E. Faxon del.

ACER DIABOLICUM, K. Koch

VIBURNUM BRACTEATUM, REHD.

VIBURNUM BRACTEATUM, *n. sp.*

Leaves deciduous, petioled, orbicular-ovate to ovate, from 6 to 12 centimetres long, from 4.5 to 10 centimetres broad, shortly acuminate, rarely obtusish, cordate at the base, remotely and shallowly sinuate-dentate, with obtuse and mucronulate teeth, usually entire in the lower third, ciliate, bright green and glabrous above, pale green beneath and pubescent along the midrib and the five or six pairs of veins and bearded in their axils, otherwise glabrous or nearly so, at maturity almost glabrous; petioles grooved above, glandular, from 1.5 to 2 centimetres long, furnished at the base with one or two pairs of linear ciliate stipules from 2 to 10 millimetres in length. Flowers white in terminal umbelliform cymes, from 3 to 7 centimetres in diameter, glandular-puberulous; peduncle slender, from 5 to 6 centimetres long, glandular; primary rays five to seven; raylets and pedicels furnished with conspicuous oblong-linear to linear bracts, from 6 to 12 millimetres long, glandular and ciliate, exceeding the pedicels and the flowers before anthesis; ovaries oblong, glandular; calyx-teeth semiorbicular, ciliate; corolla rotate-cupulate, about 8 millimetres across, sparingly hairy outside, the suborbicular lobes about as long or slightly longer than the tube; stamens nearly twice as long as the corolla, with oval yellow anthers. Drupe ovoid, about 1 centimetre long, bluish black; stone elliptic-ovoid, about 8 millimetres long, compressed, with two lateral grooves and a median ridge on one side and on the other side with two lateral grooves and a very shallow median groove more distinctly noticeable in the seed.

An upright shrub with many slender spreading stems, growing about 3 metres high; young branchlets glabrous and green, soon becoming light grayish brown; older branches clothed with gray bark marked with shallow longitudinal fissures; winter-buds ovate, obtusish, brown, with three to four pairs of outer ciliate scales. Flowers in May. Fruit ripens in September.

Georgia: cliffs of the Coosa River a few miles below Rome, *Chapman* in Herb. Gray, *C. S. Sargent*, May 6 and October 2, 1899, October 6, 1900.

Viburnum bracteatum is most nearly related to *Virburnum pubescens*, Pursh, *Viburnum affine*, Bush, *herb.*, *Viburnum Demetrionis*, Robinson & Deane, which all have stipulate petioles. From them it differs in its large flowers and large conspicuous bracts; from the first two species it is easily distinguished by its glandular-puberulous inflorescence, long peduncles, and the shallowly and obtusely toothed leaves, and from *Viburnum Demetrionis* by the shorter petioles, the semiorbicular calyx-teeth, the close bark, and by the venation and serration of the leaves.

Specimens in bud collected by Professor Sargent differ in their smaller inflorescences and smaller longer-petioled leaves from the type represented on the plate, and show the remarkable peculiarity that the rays of the inflorescence do not spring from one point, but are inserted at different heights on the somewhat elongated axis, thus forming a paniculiform cyme umbel-like in outline.

Viburnum bracteatum has been introduced into the gardens at Biltmore, but it is still too soon to speak of its hardiness or value as a garden plant.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate LXVIII. Viburnum bracteatum.

1. A flowering branch, natural size.
2. Part of an inflorescence, enlarged.
3. A flower with the corolla displayed, enlarged.
4. An ovary, enlarged.
5. A fruiting branch, natural size.
6. Cross section of a fruit, enlarged.
7. A stone seen from the two sides, enlarged.

1

2

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7 8

C. E. Faxon del.

VIBURNUM BRACTEATUM, Rehd.

LONICERA WEBBIANA, DC.

LONICERA WEBBIANA, De Candolle, *Prodr.* iv. 336 (1830).[1] — Buser, *Boissier Fl. Orient.* Suppl. 277. — Koehne, *Deutsche Dendr.* 547.

LONICERA ALPIGENA, Hooker f. & Thomson, *Jour. Linn. Soc.* ii. 171 (not Linnæus) (1838). — Brandis, *Forest Fl. Brit. Ind.* 256. — Clarke, *Hooker Fl. Brit. Ind.* iii. 15. — Collett, *Fl. Siml.* 225.

LONICERA AMHERSTII, Dippel, *Handb. Laubholzk.* i. 263, f. 175 (in part, excl. Maximowicz's synonym and description of flowers) (1889).

CAPRIFOLIUM AMHERSTIANUM, Kuntze, *Rev. Gen. Pl.* i. 274, in part (1891).

LONICERA ALPIGENA, var. WEBBIANA, Nicholson, *Gard. Dict.* Suppl. 502 (1901).

Leaves petiolate, elliptic or ovate to oblong-ovate, rarely obovate or oblong-lanceolate, from 6 to 10 centimetres long and from 2.5 to 4.5 centimetres broad, mostly long acuminate, usually rounded at the base, or the lower leaves often subcordate and the upper broadly cuneate at the base, the margin ciliate and sometimes irregularly sinuate, sparingly pilose and glandular on both sides, more densely pilose, especially on the veins, and sometimes glandless beneath, usually nearly glabrous at maturity, of firm texture, dull green on the upper, and pale green on the lower surface; petioles glandular, stout, about 5 millimetres in length. Flowers in long-peduncled pairs in the axils of the middle leaves of the branches; peduncles upright, slender, thickened below the ovaries, from 3 to 4 centimetres long, sparingly hairy and glandular or nearly glabrous; bracts linear, about as long or somewhat longer than the ovaries, glandular; bractlets four, distinct, oval or ovate, scarcely one fourth as long as the ovaries, glandular-ciliate; ovaries distinct, ovoid-oblong, glabrous, three-celled; calyx-teeth very short, triangular, glandular-ciliate; corolla bilabiate, about 1.5 centimetres long, yellowish and usually tinged with purple, sometimes finally changing to dark purple, glandular and hairy outside, rarely nearly glabrous; tube about half as long as the limb, wide and strongly gibbous, abruptly contracted into a narrow stalk-like base, hairy within, lower lips oblong, upper lip divided about one third of its length into four oval lobes; stamens slightly exceeding the limb; filaments glabrous, longer than the linear-oblong anthers; style shorter than the stamens, curved, pubescent almost to the apex. Berries distinct, ovoid, about 1 centimetre high, scarlet; seeds one to three, elliptic-ovoid, compressed, from 6 to 7 millimetres long, yellowish white, with a minutely granulate testa.

An upright shrub, from 1 to 3 metres in height, with stout erect branches; young branchlets glandular and sparingly pilose or nearly glabrous, green becoming ashy gray the second year; bark of older branches shredding, light grayish brown. Winter-buds oblong-ovate, the terminal ones about 1 centimetre long, with about eight pairs of imbricate scales, glabrous, obtusish, dropping soon after the unfolding of the foliage. Flowers in June. Fruit ripens in September.

Mountain woods in central China, the Himalaya, and southeast Europe. China: west Hupeh, *E. H. Wilson* (No. 2081); Himalayas: Kashmir to Kumaon, *M. P. Edgeworth, T. Thomson, Strachey and Winterbottom, J. L. Stuart, Schlagintweit* (No. 9604); eastern Europe: Hertzegovina, *Jablonowski.*

Lonicera Webbiana has been united by many authors with *Lonicera alpigena*, Linnæus, but is readily distinguished by its distinct ovaries and the glandular and pilose pubescence. The character based on the united or distinct ovaries

[1] The name was first published by Wallich (Catal. No. 476 [1828]) without description.

has been considered unreliable, but I have found it perfectly constant in each species. *Lonicera Webbiana* is more closely related to *Lonicera Tatsiensis*, Franchet, *Lonicera heteroloba*, Batalin, *Lonicera adenophora*, Franchet, and *Lonicera heterophylla*, Decaisne, all of which have distinct ovaries. The first two species differ in the absence of glandular pubescence and the smaller foliage, the third species in its glandular but not pilose pubescence, and *Lonicera heterophylla*, including *Lonicera Karelini*, Bunge, *Lonicera oxyphylla*, Edgeworth, and *Lonicera Formanekiana*, Halacsy, which cannot be considered specifically distinct, differs in its glabrous or nearly glabrous leaves usually acute at both ends.

Lonicera Webbiana has proved hardy in the Arnold Arboretum and forms a strictly upright vigorous shrub, especially attractive late in summer, when it bears its glossy scarlet berries. The flowers are less showy. There seems to be no record of the date of the introduction of this species into cultivation, but it has been known in English gardens[1] for about thirty years and was introduced apparently directly from India into German gardens some time later.[2]

Alfred Rehder.

Arnold Arboretum.

[1] Gordon, *Garden*, xi. 410.

[2] Dippel, *Handb. Laubholzk*, i. 263.

EXPLANATION OF THE PLATE.

Plate LXIX. Lonicera Webbiana.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A corolla laid open, enlarged.
4. A pistil, enlarged.
5. A pair of ovaries, enlarged.
6. A fruiting branch, natural size.
7. A seed, enlarged.

C. E. Faxon del.

LONICERA WEBBIANA, DC.

LONICERA INTERRUPTA, BENTH.

LONICERA INTERRUPTA, Bentham, *Pl. Hartweg.* 313 (1849). — Walpers, *Ann.* ii. 733. — Eastwood, *Fl. S. Fork King's River*, 81 (Publ. Sierra Club, No. 27).

LONICERA HISPIDULA, var. INTERRUPTA, Gray, *Proc. Am. Acad.* viii. 628 (1873); *Bot. Calif.* i. 280; *Syn. Fl. N. Am.* i. pt. ii. 18.

CAPRIFOLIUM INTERRUPTUM, Greene, *Fl. Francis.* 347 (1892).

Leaves coriaceous, suborbicular, oval or obovate, from 1.5 to 3 centimetres long, obtuse, abruptly narrowed at the base into a short petiole from 1 to 5 millimetres in length, glabrous or rarely ciliate and sparingly pubescent or puberulous on both sides, pale bluish green above, glaucescent or glaucous beneath, only one or the uppermost pairs below the inflorescence connate into orbicular or oval disks, rarely distinct. Flowers in terminal spikes of three to twelve remote whorls; bracts shorter than the bractlets, generally ovate, glabrous or sometimes ciliate; bractlets orbicular, almost as long as the subglobose glabrous ovaries, calyx-teeth minute, glabrous; corolla bilabiate, from 12 to 15 centimetres long, yellowish, glabrous outside, tube gibbous, about as long as the limb, hairy within especially near the mouth, the lower lip oblong, reflexed, the upper lip usually recurved, divided about one third or one fourth of its length into broadly ovate or oval lobes; stamens about as long as the limb, with the filaments slightly hairy at the base; style somewhat exceeding the filaments, glabrous. Fruit a globose scarlet berry about 8 millimetres in diameter, few-seeded; seeds oval, compressed, from 6 to 7 millimetres long, yellowish white, with a finely granulate testa.

A bushy much-branched shrub, from 1 to 2.5 metres in height, with slender often sarmentose hollow branches, little or not disposed to twine; young branchlets glabrous, rarely puberulous, green and often tinged with purple and covered with a glaucous bloom; old branches clothed with gray or light grayish brown shredding bark. Flowers in May and June. Fruit ripens in September.

On dry hillsides throughout California and east to the Santa Catalina Mountains in Arizona.

California: Shasta County, *H. E. Brown* (Herb. Biltmore); Placer County, New Castle, *A. Eastwood*, September 8, 1894; Amador County, Middle Fork and New York Falls, *G. Hansen*, No. 137; Mariposa County, Yosemite Valley, *A. Gray*, 1872, *J. C. Phillips and C. S. Sargent*, 1878; Bear Mountain, *J. Torrey*, 1865; Mt. Bullion and Bear Valley, *H. N. Bolander*, No. 4945; Tulare County, Three Rivers, *A. Eastwood*, May, 1894; Monterey County, Monterey, *Hartweg* (type!); Chico Cañon, *A. Gray*, 1885; Jolon, *T. S. Brandegee*, 1885, *A. Eastwood*, September 22, 1894, *C. S. Sargent*, September 12, 1896; San Bernardino, *S. B. and W. F. Parish*, May, 1881. Arizona: Santa Catalina Mountains, *C. G. Pringle*, May 22, 1881, *J. G. Lemmon*, May, 1881.

Lonicera interrupta with *Lonicera hispidula*, Douglas, and *Lonicera subspicata*, Hooker & Arnott, forms a well-defined group of nearly related species differing from the other American Honeysuckles of the subgenus Periclymenum in the large bractlets and the small corolla with short strongly gibbous tube. *Lonicera interrupta* is chiefly distinguished from *Lonicera hispidula* by the small generally oval obtuse leaves narrowed at the base, by the absence of the stipular appendages of the petioles and the absence of pilose and glandular pubescence, by the very small glabrous yellowish corolla, and by the bushy habit. From *Lonicera subspicata* it differs in its glabrous broader leaves, the uppermost connate, rarely distinct and sessile, the glabrous corolla, and the glabrous elongated and many-flowered inflorescence. Those forms of *Lonicera interrupta* with all the leaves separate and pubescent have often been confounded

with *Lonicera subspicata ;* but they are readily distinguished by the glabrous inflorescence and the broader leaves which do not exhibit the marked contrast between the dark green glabrous rugulose upper side and the whitish tomentose rarely glabrous and pale green under side, characteristic of the leaves of *Lonicera subspicata*, but are pale bluish green and pubescent on both sides. *Lonicera subspicata* is distinguished further by the peculiarity, in which it differs remarkably from all other species of the subgenus, of developing usually only two flowers in each whorl.

Lonicera interrupta has not yet been introduced into cultivation ; it will probably not be hardy in the northern parts of the eastern states or in northern and central Europe. It is less showy than most other species of the subgenus Periclymenum.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE LXX. LONICERA INTERRUPTA.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A corolla laid open, enlarged.
4. A cluster of three flowers with their bracts and bractlets, the corolla removed.
5. A fruiting branch, natural size.
6. A seed, enlarged.

C. E. Faxon del.

LONICERA INTERRUPTA, Benth.

LIGUSTRUM CILIATUM, Bl.

Ligustrum ciliatum, Blume, *Mus. Bot. Lugd. Bat.* i. 312 (1849–51). — Miquel, *Ann. Mus. Lugd. Bat.* ii. 263; *Prol. Fl. Jap.* 151. — Franchet & Savatier, *Enum. Pl. Jap.* i. 313; ii. 436. — Rehder, *Bailey Cycl. Am. Hort.* ii. 912.

Ligustrum Ibota, Siebold & Zuccarini, *Abhand. Acad. Münch.* iv. pt. iii. 167 (not Siebold) (1847). — Decaisne, *Nouv. Arch. Mus.* sér. 2, ii. 17 (in part). — K. Koch, *Dendr.* ii. 276. — Koehne, *Deutsche Dendr.* 501.

Ligustrum Tschonoskii, Decaisne, *Arch. Nouv. Mus.* sér. 2, ii. 18 (1879).

Ligustrum Ibota, var. ciliatum, Dippel, *Handb. Laubholzk.* i. 133, f. 82 (1889).

Leaves deciduous, short-petiolate, elliptic or elliptic-ovate to oblong-ovate, rarely obovate, from 2.5 to 6 centimetres long and from 1.5 to 2.5 centimetres broad, acute, rarely obtusish, mucronulate, broadly cuneate at the base, dark green above, paler beneath, sparingly pubescent on both sides, or nearly glabrous except along the midribs, ciliolate on the margins; petioles pubescent, from 2 to 5 millimetres in length. Flowers nearly sessile in ovate to cylindric-oblong five to many-flowered dense-pubescent panicles, from 1 to 4 centimetres long at the end of short branchlets; calyx glabrous, cupulate, truncate or indistinctly four-toothed, about 1.5 millimetres long; corolla white, salverform, about 8 millimetres in length, the cylindric tube about three times longer than the four ovate-lanceolate spreading and finally recurved lobes; stamens two, with very short filaments inserted a little below the mouth; anthers linear-oblong, exceeding the tube by one half or more of their length, shorter than the corolla-lobes; style slender, about two thirds as long as the corolla-tube. Berry subglobose or oblique-ovoid, from 6 to 7 millimetres long, black and glossy, rarely covered by a slight bloom; seed ovoid, about 6 millimetres long, very slightly grooved on both sides.

A shrub, from 1 to 2.5 metres in height, with upright or spreading branches forming a bush of broad pyramidal outline; young branchlets finely pubescent or puberulous, green or green tinged with purple, becoming light yellowish gray and nearly glabrous their second year; bark of the stems light grayish brown with numerous very shallow longitudinal fissures; winter-buds ovoid, small, from 2 to 5 centimetres long, glabrous, consisting of three to four pairs of light brown outer scales. Flowers appear in June and July. Fruit ripens in October and remains on the branches through the whole winter.

Japan: Hokkaido, Iwanai, *Tokubuchi*, July 16, 1888, Sapporo, *Tokubuchi*, September 18, 1889; Hondo, shores of Lake Hakone, *C. S. Sargent*, August 26, 1892, Mt. Fuji-san, *P. Codman*, 1892; Nippon media, *Tschonoski*, 1866; without locality, *P. von Siebold;* Kiu-siu, Nagasaki, *Maximowicz*, 1863; Saghalin, *Glehn*, 1861.

Ligustrum ciliatum is most nearly related to *Ligustrum Ibota*,[1] but differs in its upright inflorescence, the sessile flowers, the glabrous calyx, the ciliolate leaves, the glossy berries, and the upright or divaricately spreading branches. The

[1] *Ligustrum Ibota*, Siebold, *Verh. Bat. Genootsch.* xii. 36 (1830). — Miquel, *Ann. Mus. Ludg. Bat.* ii. 263; *Prol. Fl. Jap.* 151. — Franchet & Savatier, *Enum. Pl. Jap.* i. 313; ii. 436. — Sargent, *Garden and Forest*, vi. 425, f. 64. — Rehder, *Möller's Deutsche Gärtn.-Zeit.* xiv. 218, fig.; *Bailey Cycl. Am. Hort.* ii. 912, f. 1276. — Shirasawa, *Icon. Ess. Forest Fl. Jap.* i. 128, t. 83.

Ligustrum obtusifolium, Siebold & Zuccarini, *Abhand. Acad. Münch.* iv. pt. iii. 168 (1846). — K. Koch, *Dendr.* 274. — Dippel, *Handb. Laubholzk.* i. 131, f. 80. — Koehne, *Deutsche Dendr.* 501.

The illustrations quoted above represent what I take to be the typical *Ligustrum Ibota*, except Dippel's figure of *Ligustrum obtusifolium*, which differs by the upright somewhat larger inflorescence and the leaves being usually rounded at both ends.

typical form has a few-flowered usually slender-pedunculate inflorescence, but slightly exserted stamens, and broader often nearly glabrous leaves, while the form represented by *Ligustrum Tschonoskii* has a more elongated cylindrical inflorescence on a short and stout peduncle, and more pubescent leaves. The plant cultivated at the Arnold Arboretum resembles more this form than the type.

Ligustrum ciliatum was introduced into the Arnold Arboretum in 1892 by Professor Sargent, who collected seeds in Japan and subsequently distributed them as *Ligustrum medium*,[1] a species with which it had been confounded by some Japanese botanists as their herbarium specimen shows. It had, however, been in cultivation before, as it was described in 1872 by K. Koch and mentioned as cultivated in the Botanic Garden at Berlin. *Ligustrum ciliatum* has proved perfectly hardy at the Arnold Arboretum. It is a handsome shrub for borders of shrubberies, and in winter its abundant glossy berries are attractive. It is, however, less ornamental than *Ligustrum Ibota* and loses its leaves earlier than any other species of this genus.

ALFRED REHDER.

Arnold Arboretum.

[1] The true *Ligustrum medium* of Franchet & Savatier is a half evergreen species, and seems hardly different from *Ligustrum ovalifolium*, Hasskarl. A good figure of it is given by Shirasawa (*Icon. Ess. Forest Fl. Jap.* i. 128, t. 84). The only difference between the typical *Ligustrum ovalifolium* and *Ligustrum medium* seems to be the slight pubescence which sometimes occurs on the inflorescence and on the under side of the midribs.

EXPLANATION OF THE PLATE.

PLATE LXXI. LIGUSTRUM CILIATUM.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. Vertical section of a flower, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit, enlarged.
6. Cross section of a fruit, enlarged.
7. A seed, enlarged.
8. An embryo, enlarged.

C. E. Fason del.

LIGUSTRUM CILIATUM, Bl.

LIGUSTRUM AMURENSE, Carr.

Ligustrum Amurense, Carrière, *Rev. Hort.* 1861, 352, f. 85.— Rehder, *Bailey Cycl. Am. Hort.* ii. 913.

Ligustrum Ibota, Dippel, *Handb. Laubholzk.* i. 132, f. 81 (excl. varieties) (1889).

Leaves deciduous, short-petioled, elliptic to oblong, rarely oval, from 3 to 7 centimetres long and from 1.5 to 3.5 centimetres broad, obtuse at the ends or especially those of the more vigorous branches narrowed and acute at the ends, usually glabrous or pubescent on the midrib beneath and sometimes slightly ciliolate, dark green above, pale beneath, usually purplish on the margins while young; petioles from 2 to 4 millimetres in length, glabrous or pubescent. Flowers white in pubescent rather loose panicles, oblong or ovate in outline, the terminal ones from 6 to 10 centimetres long, the lateral ones smaller; pedicels about as long as the calyx, puberulous; calyx cupulate, truncate or indistinctly four-toothed, glabrous or puberulous toward the base, 1.5 millimetres long; corolla salverform, about 8 millimetres long, the cylindric tube about three times as long as the four ovate-lanceolate spreading lobes; stamens two, inserted on short filaments below the mouth with only the tips of the anthers exserted; style about two thirds the length of the tube. Berries oblique-ovoid, from 6 to 7 millimetres long, black covered with a bluish bloom; seed ovoid-oblong, about 6 millimetres in length, grooved on the ventral suture, slightly and irregularly ridged on the back, brown.

A shrub, from 2 to 4 metres in height, with strictly upright branches forming a rather narrowly pyramidal head; branchlets pubescent or puberulous and usually purplish while young, becoming light yellowish gray after their first year; bark of the stems smooth and marked with short horizontal lenticels and finally fissured; winter-buds small, ovate, acutish, from 2 to 3 millimetres long, pubescent, light yellowish brown, with three or four pairs of outer scales.

Ligustrum Amurense was introduced, according to Carrière, in 1860 into the Jardin des Plantes at Paris from the Botanic Garden at St. Petersburg, and was supposed to be a native of Amurland, but I have seen no wild specimens which can be referred to this Privet.

Ligustrum Amurense is closely related to *Ligustrum Ibota*, differing from it chiefly in its strictly upright habit, the upright larger and looser inflorescence, the glabrous or only slightly pubescent calyx, and the less exserted anthers. It has proved hardy at the Arnold Arboretum, where it grows about as tall as *Ligustrum ovalifolium*, Hasskarl, to which it is very similar in habit. On account of its vigorous growth and upright habit it is a useful hedge plant. It holds its leaves until very late in autumn, and in more southern regions it is even half evergreen.

Alfred Rehder.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate LXXII. Ligustrum Amurense.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. Vertical section of a flower, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit, enlarged.
6. A seed, enlarged.
7. An embryo, enlarged.

C. E. Faxon del.

LIGUSTRUM AMURENSE, Carr.

GRYPOCARPHA, GREENM.

GRYPOCARPHA,[1] Greenman, *n. gen.* of *Compositæ* (*Zinnieæ*).

Heads heterogamous, radiate; involucre campanulate; bracts of the involucre 2 to 3-seriate, free; receptacle conical, paleaceous; pales conduplicate, attenuate, uncinate-tipped; ray-flowers uniseriate, fertile; rays sessile, persistent; achenes triangular; disk-flowers regular, perfect; corolla 5-toothed; anthers short-sagittate at the base, appendaged at the apex; style-branches short-appendaged; pappus of 1 to 2 awns; achenes laterally compressed, somewhat 4-angled. Shrubby plants with opposite leaves and terminal corymbose cymes.

GRYPOCARPHA NELSONII, *n. sp.*

Leaves petiolate, ovate to ovate-lanceolate, from 4 to 8 centimetres long, from 2 to 5 centimetres broad, acuminate or acute, serrate-dentate, cuneate to subcordate at the base, 3-nerved, glabrous on both surfaces, yellowish green above, paler beneath; petioles from 1 to 2 centimetres in length, canaliculate; inflorescences terminating the stem and branches in few-headed corymbose cymes; peduncles from 1 to 2.5 centimetres long; heads 1 to 1.2 centimetres high, including the rays when fully expanded 2.5 centimetres in diameter; involucral bracts lance-linear, acute or acutish, more or less squarrose, the outer bracts longer than the inner; ray-flowers from eight to ten; rays yellow; achenes triangular, bearing a single stout awn on the inner angle; disk-flowers numerous; corollas barely differentiated into tube and limb; pappus of two unequal awns; achenes glabrous.

A much-branched shrub, glabrous throughout; the stem and branches covered with a grayish bark, and with the ultimate branches striate and leafy to the inflorescences.

Mexico: State of Chiapas, top of ridge back of Tonala, at altitudes from 370 to 780 metres above the sea-level, *E. W. Nelson* (No. 2892), August 10, 1895.

The nearest affinity of the genus here proposed is with Heliopsis, from which it differs in the character of the pappus, and in the peculiar uncinate-tipped pales of the receptacle.

J. M. GREENMAN.

Gray Herbarium.

[1] From *γρυπός*, curved, *καρφος*, a pale.

EXPLANATION OF THE PLATE.

Plate LXXIII. Grypocarpha Nelsonii.

1. A flowering branch, natural size.
2. Vertical section of a head showing ray- and disk-flowers, enlarged.
3. A disk-flower with its palea, enlarged.
4. A ray-flower, enlarged.
5. A stamen, front view, enlarged.

GRYPOCARPHA NELSONI, Greenm.

VACCINIUM POASANUM, Donn. Sm.

Vaccinium Poasanum, J. Donnell Smith, *Bot. Gazette*, xxiv. 395 (1897); *Pittier Primitiæ Floræ Costaricensis*, ii. 145.

Glabrous with the exception of the filaments. Leaves coriaceous, entire, oblong-elliptical, from 5 to 7 centimetres long, from 2 to 3 centimetres broad, contracted-acuminate, acute at the base; petioles 2 or 3 millimetres long; racemes axillary, subequaling the leaves; pedicels four to fourteen, from 1 to 2 centimetres in length, bracteate at base, bibracteolate below the middle; flowers 5-merous; calyx turbinate, 4 millimetres high, repand-dentate; corolla white, cylindrical-campanulate, from 1 to 1.2 centimetres long, not contracted above, its lobes acuminate-ovate, 3 millimetres in length; stamens free, nearly equaling the tube of the corolla; anthers awnless, their cells nearly as long as the filaments, twice shorter than the tubes, pores oblique; berry 6 or 7 millimetres in diameter; seeds numerous.

A shrub, about 2 metres high, bearing flowers and fruit simultaneously; apparently blooming throughout the year.

Costa Rica: Province of Alajuela, volcano of Poás, Potrero del Alto, at an altitude of 2460 metres, *Enrique Pittier* (No. 760), January, 1889; borders of the crater of Poás, at an altitude of 2644 metres, *J. Donnell Smith* (No. 6634 of my Series of Centr. Am. Plants), March, 1896; same locality, *Adolfo Tonduz* (No. 10783), November, 1896; Province of Cartago, volcano of Turrialba, at an altitude of 2800 metres, *Pittier* (No. 13071), (No. 7542 of my Series) January, 1899.

This is a subalpine species, and seems to require a soil with a mixture of volcanic ash. Such, at least, is the character of the soil on the borders of the upper-lake crater of Poás. It supports only a shrubby vegetation, of which this Vaccinium and *Vaccinium consanguineum*, Klotzsch, form a considerable part, the small lake lying deep below, and emitting at short intervals jets of sulphurous vapor and water.

The large leaves and flowers, also the long pedicels, suffice to distinguish this species from all tropical American congeners. Specimens have been communicated to the following herbaria: Arnold Arboretum; Harvard University; Smithsonian Institution; Columbia University; University of Chicago; Royal Botanical Gardens, Kew; British Museum; Königl. Bot. Museum, Berlin.

John Donnell Smith.

Baltimore.

EXPLANATION OF THE PLATE.

Plate LXXIV. Vaccinium Poasanum.

1. A flowering branch, natural size.
2. A flower, with the corolla displayed, enlarged.
3. A stamen, front and side views, enlarged.
4. A fruiting branch, natural size.
5. A berry, divided transversely, enlarged.
6. A seed, enlarged.

C. E. Faxon del.

VACCINIUM POASANUM, Donn. Sm.

PINUS TERTHROCARPA, SHAW.

PINUS TERTHROCARPA, *n. sp.*

PINUS OCCIDENTALIS, Richard, *Fl. Cub.* iii. 233 (at least in part) (not Swartz) (1853).

PINUS CUBENSIS var.? TERTHROCARPA, Grisebach, *Cat. Pl. Cub.* 217 (1866). — Engelmann, *Trans. St. Louis Acad.* iv. 185.

PINUS RECURVATA, Rowlee, *Bull. Torrey Bot. Club*, xxx. 107 (in part) (1903).

PINUS CUBENSIS var. ANOMALA, Rowlee, *Bull. Torrey Bot. Club*, xxx. 108 (in part) (1903).

Leaves in clusters of two, rarely of three, rigid, straight, serrate, from 1.5 to 2.5 decimetres in length; resin ducts numerous, unusually large, marginal, the largest spanning the whole width of the parenchyma from the epidermal to the central cells, bordered by a narrow row of strengthening cells, found also in detached masses close against the epidermis and forming an irregular, continuous group between and on both sides of the pair of wood-bundles; sheaths persistent, becoming 1.3 centimetres long. Staminate flowers clustered, about 1.5 centimetres in length, surrounded at the base by six or seven involucral bracts; anthers suborbicular, denticulate. One-year-old cones subterminal and erect, single, in pairs or in clusters of three or four, about 1.5 centimetres long, pedunculate, with a short straight stalk, all but the basal scales terminated by a minute tubercle; mature cone short-stalked, rounded at the base, tapering to the narrow apex, from 6 to 7.5 centimetres long and about half as wide, symmetrical, growing at nearly right angles to the branch or inclined toward its apex, orange-brown, usually early deciduous; apophysis of the scale delicately corrugated from the margins inward, culminating in a transverse keel and a rather small spineless umbo.

A tree, from 17 to 20 metres in height, with a trunk often 6 decimetres in diameter, clothed with thick grayish bark tinged with red and irregularly broken into large oblong plates separating on the surface into small closely appressed scales, branches forming a broad round-topped open irregular head, and branchlets from 1.3 to 1.7 centimetres thick, covered with the crowded prominent bases of the primary leaves.

Cuba: *C. Wright* (No. 3189 in Herb. Gray); Herradura, Province of Pinar del Rio, *G. R. Shaw*, February, 1903. Isle of Pines: *W. W. Rowlee*, February, 1901 (Nos. 231, 232, 233, in part); Santa Fé, Isle of Pines, *G. R. Shaw*, February, 1903.

At Herradura, in western Cuba, *Pinus terthrocarpa* is the only Pine; at Santa Fé it grows partly alone and partly with *Pinus heterophylla*, Sudworth. Here the flowers of *Pinus terthrocarpa* had already been fertilized, while those of *Pinus heterophylla* were just opening. In both localities the trees have been largely cut, and it is probable that trees of the largest size no longer exist. Richard ascribes *Pinus occidentalis* to western Cuba and the Isle of Pines, two localities where *Pinus terthrocarpa* grows; but in an unpublished manuscript in the Gray Herbarium entitled *Flora Domingensis* Dr. Asa Gray writes: "Richard having made the mistake of considering the Cuban Pine Swartz's species, *Pinus occidentalis* in the later books has been attributed to Cuba. I have not seen it there."

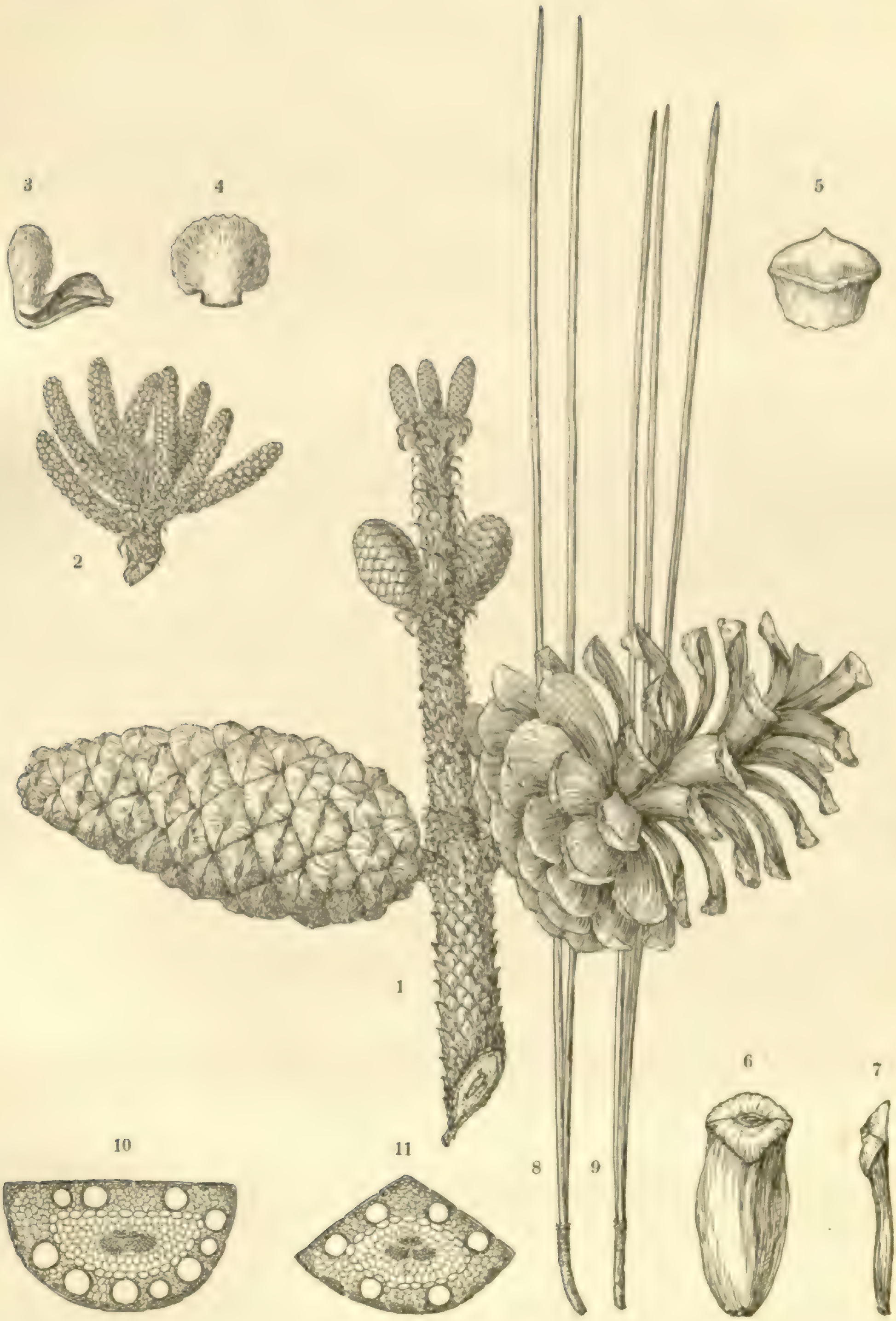
GEORGE RUSSELL SHAW.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate LXXV. Pinus terthrocarpa.

1. A fruiting branch, the leaves removed, natural size.
2. A cluster of staminate flowers, natural size.
3. An anther, side view, enlarged.
4. An anther, front view, enlarged.
5. A scale of a one-year-old cone, enlarged.
6. A cone-scale, front view enlarged.
7. A cone-scale, side view enlarged.
8. A two-leaved cluster of leaves, natural size.
9. A three-leaved cluster of leaves, natural size.
10. Cross section of a leaf of a two-leaved cluster, much enlarged.
11. Cross section of a leaf of a three-leaved cluster, much enlarged.



C. E. Faxon del.

PINUS TERTHROCARPA, Shaw

SILVA OF NORTH AMERICA

IN September, 1890, Messrs. Houghton, Mifflin & Company announced the publication of Sargent's *Silva of North America* in twelve quarto volumes, illustrated with six hundred plates engraved in Paris under the direction of A. Riocreux from drawings made by C. E. Faxon. The last of these volumes was published in January, 1899, the twelve volumes containing six hundred and twenty plates.

The publication of this exhaustive and monumental work has stimulated the study of trees in the United States in a remarkable and gratifying manner, and during its progress the number of trees recognized by botanists in North America north of Mexico, the region covered by the *Silva*, has increased to 567 from 422, the number announced in Messrs. Houghton, Mifflin & Company's circular of 1890. For this reason two supplementary volumes were added, containing 115 new plates and a thorough index of the entire work. They were published in the fall of 1902, thus completing the set.

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TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

PREPARED CHIEFLY FROM MATERIAL AT
THE ARNOLD ARBORETUM OF
HARVARD UNIVERSITY

AND EDITED BY

CHARLES SPRAGUE SARGENT

Director of the Arnold Arboretum; Author of
The Silva of North America

PART IV

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ACER WILSONI
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TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

THIS work consists of a series of plates, accompanied by brief descriptions, of new or little known trees and shrubs. It is edited by Professor C. S. Sargent, the author of *The Silva of North America* and the Director of the Arnold Arboretum of Harvard University, with the assistance of a number of specialists; and the plates are reproductions of original drawings made by Mr. C. E. Faxon, the most skillful and experienced botanical draftsman in America, whose work is familiar to the readers of Professor Sargent's *Silva* and of *Garden and Forest.* The material which serves as a basis for the work has been derived largely from the living collections and herbarium of the Arnold Arboretum. It will not be confined wholly to North American plants, but will include also the woody plants of other regions, especially those of the northern hemisphere which may be expected to flourish in the gardens of the United States and Europe, and those of special commercial or economic interest and value. This publication does not duplicate in any way *The Silva of North America*, but is supplementary to that publication, as from time to time it will contain descriptions and figures of trees newly discovered in North America.

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4 PARK STREET, BOSTON

ACER TRUNCATUM, Bunge.

Acer truncatum, Bunge, *Mém. Sav. Étr. Acad. Sci. St. Pétersbourg*, ii. 84 (1835). — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 444; *Mél. Biol.* x. 601. — Nicholson, *Gard. Chron.* n. ser. xvi. 375. — Franchet, *Nouv. Arch. Mus. Paris*, sér. 2, v. 76 (*Pl. David.* i.); *Mém. Soc. Sci. Nat. Cherbourg*, xxiv. 208. — Pax, *Engler Bot. Jahrb.* vii. 234; *Engler Pflanzenreich*, Heft 8 (iv. 163), 46. — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 142. — Koehne, *Deutsch. Dendr.* 381.

Acer lætum, β truncatum, Regel, *Bull. Phys. Math. Acad. Sci. St. Pétersbourg*, xv. 217 (1857); *Mél. Biol.* ii. 486.

Acer Lobelii, subsp. truncatum, Wesmael, *Bull. Soc. Bot. Belg.* xxix. 56 (1890).

Leaves deciduous, membranaceous, semiorbicular in outline, from 5 to 10 centimetres long, from 7 to 12 centimetres broad, truncate at the base, palmately five or rarely seven-lobed, dark yellowish green above, light green and reticulate beneath, and glabrous with the exception of axillary tufts of hairs at the base of the primary veins, with sinuses reaching about half way to the middle, the lobes triangular, long-acuminate, aristate, and entire; their petioles slender, from 3 to 7 centimetres long, and glabrous or puberulous at the base, especially while young. Flowers andro-monœcious, on slender pedicels about 1 centimetre long and viscid-puberulous toward the apex like the base of the calyx, in upright compound glabrous or finely puberulous corymbs, on peduncles to 1.5 centimetres in length; sepals five, elliptic to oblong, from 4 to 5 millimetres long, obtuse, greenish yellow; petals five, oblong-obovate, from 6 to 7 millimetres long, obtuse, yellowish white; stamens eight, inserted at the margin of the slightly eight-lobed disk, about one third as long as the petals in the staminate flower, shorter in the pistillate flower; anthers oval; ovary viscidulous; style short, with two long and slender stigmas. Fruits in about three to five-fruited pendulous corymbs; nutlet ovate, slightly compressed, almost smooth, about 12 millimetres long and 9 millimetres broad; wings with the nutlet about 3 centimetres long, 1 centimetre broad, not narrowed near the base, spreading at right or obtuse angles; embryo with conduplicate accumbent cotyledons.

A tree from 7 to 8 metres high, with grayish brown bark; branchlets green or tinged with purple while young, becoming light reddish brown at the end of their first season, and grayish brown and marked by slight fissures in their second year; winter-buds small, ovate, obtusish, with two or three pairs of decussate puberulous outer scales. Flowers appearing with the leaves which are usually purplish when they unfold.

North China: Chihli, *S. W. Williams*, June, 1865 (ex Herb. Hance, No. 10508), *Bretschneider*, 1882, *C. S. Sargent*, September 17, 1903; Shantung and Kiangsi (ex Forbes & Hemsley). No. 5410, *Henry*, from Hupeh, which is referred by Pax to this species, does not seem to belong here; and it appears doubtful if this species occurs in central China.

Acer truncatum is closely related to *Acer pictum*, Thunberg, differing from that species chiefly in its distinctly truncate generally five-lobed leaves, and in its larger flowers. It was introduced by Dr. Bretschneider into the Arnold Arboretum in 1882. There are now several forms in cultivation. Count von Schwerin [1] separates from the type which he calls *Acer truncatum*, var. *nudum*, a variety *pilosum* which has the veins on the under side of the leaves densely pubescent. This variety he divides again in a normal green form, *Acer truncatum*, f. *barbinerve*, and a variegated

[1] *Mitt. Deutsch. Dendr. Gesell.* v. 81 (1896).

form, *Acer truncatum*, f. *albo-variegatum*. As the flowers and fruits of these forms are still unknown, it is not certain that they belong to this species. The young plants cultivated in the Arnold Arboretum have generally smaller leaves than the type, with the middle lobe furnished with one to four bristle-tipped teeth, and the lateral lobes with sometimes one or two teeth. L. Späth has also noticed this peculiarity in cultivated plants.[1] These are probably juvenile forms similar to those observed in other Maples as in *Acer trifidum*, Hooker & Arnott, and the teeth may disappear from the leaves of older trees.

ALFRED REHDER.

Arnold Arboretum.

[1] *Gartenflora*, xlii. 376 (1893).

EXPLANATION OF THE PLATE.

PLATE LXXVI. ACER TRUNCATUM.

1. A flowering branch, natural size.
2. A staminate flower, enlarged.
3. A pistillate flower, enlarged.
4. An ovary, enlarged.
5. A fruiting branch, natural size.
6. An embryo, enlarged.
7. A leaf from a cultivated plant, natural size.

C. E. Faxon del

ACER TRUNCATUM, Bunge

ACER OLIVERIANUM, PAX.

ACER OLIVERIANUM, Pax, *Hooker Icon.* xix. under t. 1897 (1889); *Engler Pflanzenreich,* Heft 8 (iv. 163), 21. — Henry, *Gard. Chron.* ser. 3, xxxiii. 100.

Leaves deciduous, membranaceous, five-lobed, from 5 to 8 centimetres long, from 5 to 9 centimetres broad, truncate or subcordate with a wide sinus at the base, dark yellowish green above, slightly lighter, lustrous and reticulate beneath, and glabrous with the exception of axillary tufts of pale hairs on the lower side, with acute sinuses reaching about half way to the middle, the lobes triangular-ovate, acuminate, sharply serrulate; their petioles slender, glabrous, and from 2.5 to 6 centimetres long. Flowers andro-monœcious on slender pedicels, in glabrous nodding corymbs about 3 centimetres broad, on slender peduncles about 2 centimetres in length and terminal on a two-leaved branchlet; sepals five, elliptic-ovate, 2 millimetres long, obtusish, sometimes irregularly denticulate, purplish; petals five, ovate or broadly ovate-obtuse, of about equal length, denticulate, white; stamens eight, longer than the petals, inserted inside the slightly lobed disk; ovary sparingly villose, with long hairs, minute, villose, and rudimentary in the staminate flower; style nearly 2 millimetres long, much longer than the two recurved stigmas. Fruits in pendulous corymbs, glabrous; nutlets convex, about 6 millimetres long and 5 millimetres broad, distinctly veined, brown; wings spreading nearly horizontally with the nutlets, 2.5 centimetres in length, about 1 centimetre in width, light brownish yellow; embryo with accumbent twice conduplicate cotyledons.

A tree from 5 to 7 metres high; branchlets smooth, without lenticels, glabrous and green or purplish while young, greenish brown or olive brown in their second year and more or less covered with a grayish white waxy bloom; winter-buds small, ovate, with one pair of outer scales, covered by the dilated base of the petioles before the leaves fall. Flowers appearing in May with the leaves.

China: Hupeh, *Henry* (No. 6512, type!) (No. 6187 doubtfully referred here), Changyang, *E. H. Wilson*, May, 1900 (No. 716).

Acer Oliverianum seems most nearly related to *Acer Campbelli*, Hiern, which, however, is easily distinguished from it by its paniculate inflorescence. It is also very similar to *Acer palmatum*, Thunberg, especially to the form with five-lobed leaves, from which it may be distinguished by the simple and less close serration, the slightly elongated and looser corymb, and the larger fruit. *Acer Oliverianum* forms thus a connecting link between the two groups of Spicata and Palmata. A rather peculiar form here doubtfully referred to *Acer Oliverianum* is Henry's No. 6187 which in fruit and in the texture and serration of the leaves shows some relation to *A. Sinense*, Pax, and suggests a possible hybrid between the two species.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate LXXVII. Acer Oliverianum.

1. A flowering branch, natural size.
2. A staminate flower, enlarged.
3. A sepal, enlarged.
4. A petal, enlarged.
5. A pistillate flower with the perianth removed, enlarged.
6. A fruiting branch, natural size.
7. A fruit, enlarged.
8. An embryo, enlarged.
9. An embryo, enlarged.

C. E. Faxon del.

ACER OLIVERIANUM, Pax

ACER SINENSE, PAX.

ACER SINENSE, Pax, *Hooker Icon.* xix. under t. 1897 (1889); *Engler Pflanzenreich*, Heft 8 (iv. 163), 22. — Henry, *Gard. Chron.* ser. 3, xxxiii. 100.

Leaves deciduous, chartaceous, five-lobed, from 7 to 14 centimetres long, slightly broader than long, cordate with a wide sinus or sometimes truncate at the base, dark bluish green and lustrous above, glaucescent and reticulate beneath, and glabrous with the exception of axillary tufts of yellowish hairs on the lower surface, with acute sinuses reaching half way to the middle or less, the lobes ovate, acuminate, sparingly appressed-serrate except near the base; their petioles rather stout, 2.5 to 5 centimetres long, and glabrous. Flowers andro-monœcious on slender pedicels, in pendulous many-flowered panicles from 5 to 7 centimetres long, on terminal peduncles from 2.5 to 4 centimetres in length; sepals triangular-oblong, 2 millimetres long, acutish, greenish, slightly ciliate; petals shorter than the sepals, oval to oblong, irregularly dentate, white; stamens longer than the sepals, inserted inside the glabrous disk; ovary pilose, rudimentary in the staminate flower; style 2 to 4 millimetres long, with very short spreading stigmas. Fruits in pendulous panicles; nutlets convex, about 7 millimetres long and 5 millimetres broad, brown; wings spreading at right angles or horizontally, with the nutlet about 3 centimetres long and 1 centimetre broad, broadest toward the apex, and light yellowish brown, or purplish while young.

A tree 3 metres high (according to Wilson); branchlets yellowish or yellowish brown to dark brown, smooth, glabrous while young; winter-buds with one pair of outer scales, covered by the enlarged bases of the petioles before the leaves fall. Flowers appearing in May.

China: Hupeh, *Henry* (No. 5831, type !, and No. 5641), south Wuchang, *E. H. Wilson*, May, 1900 (No. 616); Szechuen (ex Pax). *

Acer Sinense is closely related to *Acer Campbelli*, Hiern, differing chiefly from that species in the five-lobed leaves glaucescent beneath, in their shorter and broader lobes, in the longer style and the glabrous disk. Pax distinguishes *Acer Sinense*, var. *β concolor*,[1] differing from the type in the slightly larger leaves and the horizontally spreading fruits. The specimens collected by Wilson which are here figured belong apparently to this variety which hardly seems distinct enough to be kept separate.

ALFRED REHDER.

Arnold Arboretum.

[1] *Engler Pflanzenreich*, Heft 8 (iv. 163), 22 (1902).

* Henry No. 12044. cited on p. 157 belongs here. See correction. 2:26.

EXPLANATION OF THE PLATE.

Plate LXXVIII. Acer Sinense.

1. A flowering branch, natural size.
2. A staminate flower, enlarged.
3. A pistillate flower, enlarged.
4. A fruiting branch, natural size.

2

C. E. Faxon del.

ACER SINENSE. Pax

ACER WILSONI, REHD.

ACER WILSONI, *n. sp.*

Leaves deciduous, membranaceous, from 8 to 11 centimetres long, from 9 to 10 centimetres broad, rounded at the narrowed base, and three-lobed, with an occasional minute lobe near the base, dark yellowish green above, lighter green below, glabrous with the exception of tufts of whitish hairs in the axils of the secondary veins, and reticulate-venulose, with acute sinuses reaching from a third to half way to the middle, the lobes triangular-ovate to oblong-ovate, entire or with a few small serrations near the apex; their petioles slender, from 3 to 5 centimetres long, and glabrous. Flowers andro-monœcious on slender pedicels, in nodding glabrous panicles from 5 to 6 centimetres long, on slender peduncles from 2 to 2.5 centimetres in length; sepals five, ovate-oblong, acute, about 1.5 millimetres long, greenish; petals five, about as long or a little longer than the sepals, oblong, acutish or irregularly dentate at the apex, white; stamens eight, longer than the sepals; disk extrastaminal, glabrous; ovary pilose, minute and rudimentary in the staminate flower; style 2 millimetres long, with short spreading stigmas. Fruits in pendulous panicles, brownish yellow; nutlet ovoid, about 5 millimetres long and 3 millimetres broad, convex and but slightly veined; wings spreading horizontally, with the nutlets about 2.5 centimetres long, 1 centimetre broad, and distinctly narrowed at the base.

A tree, with slender olive brown glabrous branchlets green while young; winter-buds with few pairs of scales. Flowers appearing with the leaves.

China: Hupeh, *E. H. Wilson* (No. 303). Yun-nan, *Henry*, No. 12044, is doubtfully referred to this species. *

Acer Wilsoni is most nearly related to *Acer Campbelli*, Hiern, but is easily distinguished from that species by its three-lobed leaves of thin texture, and by the glabrous disk and narrower petals.

Wilson's No. 303 consists of a flowering and of a fruiting branch. The latter differs slightly in the shorter inflorescence and in the broader and shorter lobes of the leaves, but in all other characters the two specimens agree perfectly, and there can be scarcely a doubt that they belong to the same species.

Henry's No. 12044 from Yun-nan differs in the firmer more copiously serrate leaves, and in the larger fruits which are about 4 centimetres long, with wings spreading at right angles, less narrowed at the base and decurrent on the nutlet. It certainly represents a distinct form.

ALFRED REHDER.

Arnold Arboretum.

* = Acer sinense Pax. See correction 2:26.

EXPLANATION OF THE PLATE.

Plate LXXIX. Acer Wilsoni.

1. A flowering branch, natural size.
2. A staminate flower, enlarged.
3. A pistillate flower after the perianth and stamens have dropped, enlarged.
4. A fruiting branch, natural size.

C. E. Faxon del.

ACER WILSONI, Rehd.

ACER ERIANTHUM, SCHWERIN.

ACER ERIANTHUM, Schwerin, *Mitt. Deutsch. Dendr. Gesell.* x. 59 (1901). — Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 22.

Leaves deciduous, membranaceous, five or sometimes seven-lobed, from 5 to 8 centimetres long, slightly broader than long, rounded or truncate and sometimes subcordate at the base, dark yellowish green and glabrous above, lighter green and reticulate beneath, and slightly pubescent or nearly glabrous with the exception of dense tufts of whitish hairs in the axils of the primary and secondary veins, with acute sinuses reaching from one third to nearly half way to the middle, the lobes ovate to broadly ovate, the lowest pair much smaller than the others, acuminate, sharply and unequally serrate, entire toward the base; their petioles glabrous, slender, and from 3 to 8 centimetres long. Flowers on very short glabrous pedicels, in upright compound racemes from 4.5 to 5 centimetres in length and from 1 to 1.5 centimetres in diameter, on glabrous rather stout peduncles from 2.5 to 3 centimetres long; sepals upright, broadly ovate, obtuse, about 2 millimetres long, glabrous on the outer, densely villous on the inner surface, yellowish, and rather longer than the obovate glabrous petals; stamens eight, finally exceeding the sepals; filaments glabrous, brown; anthers oval, brown; disk glabrous, brown, extrastaminal; ovary densely villous with long pale yellow hairs, in the staminate flower rudimentary and densely covered with long spreading hairs enveloping the lower part of the filaments; style about 2 millimetres in length, with spreading much shorter stigmas. Fruits apparently racemose, on pedicels about 0.5 centimetres long, purplish and pubescent while young; wings horizontally spreading, with the nutlets (not fully grown) nearly 2 centimetres long and about 8 millimetres broad.

A small tree; branchlets glabrous while young, rather stout, greenish, marked by scattered lenticels, becoming light grayish brown or yellowish brown in their second year; winter-buds with several pairs of scales.

China: Szechuen, *Henry* (No. 8989), south Szechuen and Tibet frontier, *A. E. Pratt* (No. 342, Herb. Kew); Hupeh, *E. H. Wilson*, 1901 (No. 2084).

Acer erianthum is most closely related to *Acer Campbelli*, Hiern, and differs chiefly from that species in the narrower more compact inflorescence, the broadly ovate sepals densely villous on the inner surface, and in the glabrous disk. Pax describes the disk as densely villous and the flowers as 5-merous, while I have found in Henry's and Wilson's specimens the flowers 4-merous and the disk glabrous but almost completely hidden by the hairs spreading from the rudimentary pistil and the sepals. The only species in which I have found a pubescent disk is the typical *Acer Campbelli* (Herb. Griffith, No. 926).

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate LXXX. Acer erianthum.

1. A flowering branch, natural size.
2. A staminate flower, enlarged.
3. Vertical section of a staminate flower, enlarged.
4. A pistillate flower, enlarged.
5. A fruiting branch, natural size.

C. E. Faxon del.

ACER ERIANTHUM, Schwer.

ACER FLABELLATUM, REHD.

ACER FLABELLATUM, *n. sp.*

? ACER SIEBOLDIANUM, var. ? Baker & Moore, *Jour. Linn. Soc.* xvii. 380 (not Miquel) (1880).

ACER JAPONICUM, Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 140 (in part) (not Thunberg) (1886).

Leaves deciduous, membranaceous, orbicular in outline, from 8 to 13 centimetres long and about as broad, deeply cordate at the base, usually seven-lobed, glabrous and dark green above, lighter green beneath, villous along the veins, with tufts of hairs in their axils, with acute sinuses reaching half way to the middle, the lobes ovate to ovate-oblong, acuminate to caudate-acuminate, sharply and irregularly serrate, with appressed acuminate teeth; their petioles slender, from 4 to 7 centimetres long, and villous or sometimes like the veins beneath nearly glabrous at maturity. Flowers andro-monœcious, in nodding glabrous many-flowered panicles from 3 to 5.5 centimetres long, on slender glabrous peduncles from 2 to 4.5 centimetres in length; sepals five, lanceolate-oblong, acute, about 3 millimetres long, greenish; petals five, white; stamens eight; ovary glabrous.[1] Fruits in pendulous elongated corymbs, with their peduncles from 5 to 10 centimetres in length; nutlets very convex, slightly veined, reddish brown, about 6 millimetres long and 4.5 millimetres broad; wings lighter colored or sometimes yellow, horizontally spreading, with the nutlets from 2.5 to 3.3 centimetres long, 8 to 11 millimetres broad, and broadest about the middle; seed subglobose; embryo with irregularly twice conduplicate and accumbent cotyledons.

A tree 10 metres high (according to Wilson); branchlets olive brown or reddish brown, sometimes dark purple, glabrous while young, often covered with a glaucous bloom; winter-buds with two outer pairs of glabrous imbricate scales, slightly ciliate and viscid. Flowers appearing with the leaves.

China: Hupeh, *Henry* (No. 6900, fruits), Patung, *E. H. Wilson* (No. 708, flowers), Ninto, *E. H. Wilson* (No. 1232, fruits).

Acer flabellatum seems most closely related to *Acer multiserratum*, Maximowicz, and to *Acer Oliverianum*, Pax. From the first it differs in the nodding glabrous inflorescence and in the larger horizontally spreading fruits; from the second it is easily distinguished by the deeply cordate seven-lobed leaves. In foliage and pubescence it resembles *Acer Sieboldianum*, Miquel, and *Acer circumlobatum*, Maximowicz, but the elongated inflorescence and the imbricate bud-scales show that it cannot belong to the section Palmata.

ALFRED REHDER.

Arnold Arboretum.

[1] The petals, filaments, and ovary are imperfectly developed in the only flowering specimen seen.

EXPLANATION OF THE PLATE.

Plate LXXXI. Acer flabellatum.

1. A flowering branch, natural size.
2. A flower (imperfectly developed, the petals still minute and the filaments not yet elongated), enlarged.
3. A fruiting branch, natural size.
4. An embryo, enlarged.

C. E. Faxon del.

ACER FLABELLATUM, Rehd.

ACER CAUDATUM, WALL.

ACER CAUDATUM, Wallich, *Pl. As. Rar.* ii. 4, 28 (excl. description of staminate flowers and syn. *Acer pectinatum*), t. 132 (1831). — Brandis, *Forest Fl. Brit. Ind.* 112 (in part). — Hiern, *Hooker f. Fl. Brit. Ind.* i. 695 (in part). — Pax, *Engler Bot. Jahrb.* vii. 197 (excl. syn. *Acer acuminatum*).

ACER ACUMINATUM, Dippel, *Handb. Laubholzk.* ii. 424, f. 198 (1892). — Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 15.

ACER PAPILIO, King, *Jour. As. Soc. Beng.* lxv. p. ii. 115 (1896); *Ann. Bot. Gard. Calcutta*, ix. 17, t. 24.

Leaves five or sometimes seven-lobed, from 6 to 12 centimetres long, and as broad or slightly broader than long, cordate at the base, as they unfold sparingly covered with long rufous hairs, soon nearly glabrous except on the veins beneath, and at maturity membranaceous, dark green above and pale green beneath, with acute sinuses reaching about one third to the middle, the lobes triangular-ovate, caudate, sharply incised-serrate, with acuminate teeth; their petioles from 3 to 7 centimetres long, and pubescent at the apex while young. Flowers andro-monœcious, greenish white, about as long as the slender pedicels, in terminal raceme-like cylindric rufously villose panicles from 10 to 12 centimetres long, on stout penduncles from 2.5 to 3 centimetres in length; sepals five, lanceolate, slightly pubescent on the outer surface, about 2 millimetres long; petals five, linear-oblong, acutish, exceeding the sepals, glabrous; stamens eight, about as long as the petals or slightly longer, inserted near the middle of the disk; ovary densely covered with yellowish tomentum, minute, rudimentary, and pubescent in the staminate flower; style 1.8 millimetres long, with short spreading stigmas. Fruits in upright racemes; nutlets oval, about 8 millimetres long and 6 millimetres broad, compressed and slightly veined, dark brown and puberulous or glabrescent; wings spreading at almost right angles or sometimes more or less upright, with the nutlets 25 to 28 millimetres long, 7 to 9 millimetres broad, broadest about the middle, narrowed toward the apex, and light brown; embryo compressed; cotyledons accumbent, plane or nearly so, with recurved tips.

A large tree; branchlets stout, light gray or yellowish gray, marked by prominent longitudinal elliptic or oblong yellow-brown lenticels, and glabrous or slightly fulvous-pubescent while young; winter-buds oval, conspicuous, with two glabrous outer scales and two accrescent densely fulvous-pubescent inner scales.

Sikkim Himalayas, at altitudes of from 3600 to 4000 metres, *J. D. Hooker*.

The type of this species is of a rather restricted distribution, but with the following varieties its geographical range is the widest of all Asiatic Maples, reaching from the Sikkim Himalayas through China to Mandshuria, Saghalin, and central Japan.

ACER CAUDATUM, var. MULTISERRATUM, *n. var.*

Acer multiserratum, Maximowicz, *Act. Hort. Petrop.* xi. 107 (1890). — Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 21.

Acer erosum, Pax, *Hooker Icon.* xix., under t. 1897 (1889); *Engler Pflanzenreich*, Heft 8 (iv. 163), 69. — Henry, *Gard. Chron.* ser. 3, xxxiii. 100.

Leaves from 6 to 10 centimetres long and about as broad, chartaceous, pubescent along the veins beneath, the lobes broadly triangular-ovate, acuminate, sharply and irregularly doubly serrate, with acute teeth; their petioles glabrous. Wings of the fruit spreading at less than a right angle or nearly upright, with the nutlets about 2 centimetres long, 8 to 10 millimetres broad, obtuse or nearly truncate at the apex and broadest above the middle; nutlets glabrous. Branchlets glabrous, purplish when young, marked with lenticels.

China: Kansu, *G. N. Potanin* (Herb. Kew); Hupeh, *Henry* (Nos. 6937, 6788); *E. H. Wilson* (No. 2363).

This variety differs from the type chiefly in the acute not acuminate serratures of the more chartaceous leaves, the glabrous nutlets, and the broader and shorter obtuse wings. In the serration of the leaves it is intermediate between var. *Prattii* and var. *Ukurunduense*, differing from both in its glabrescent leaves and glabrous branchlets.

ACER CAUDATUM, var. PRATTII, *n. var.*

Leaves from 6 to 10 centimetres long, chartaceous, pubescent beneath, the lobes broadly triangular-ovate, acuminate, closely and sharply doubly serrate; their petioles pubescent, especially at the base and at the apex. Wings of the fruit spreading nearly at right angles, with the nutlets from 2.3 to 2.5 centimetres long and about 8 millimetres broad; nutlets glabrous. Branchlets pubescent while young, without or with occasional lenticels.

China: Szechuen, west Szechuen and Tibet frontier, *A. E. Pratt* (No. 69); *Henry* (No. 8802).

This variety differs from the type and the var. *multiserratum* in the leaves being pubescent over the whole of the under surface, in their much finer and closer serration, in the pubescent branchlets, and from the var. *multiserratum* in the narrower and longer wings of the fruit.

ACER CAUDATUM, var. UKURUNDUENSE, Rehder, *n. comb.*

Acer Ukurunduense, Trautvetter & Meyer, *Middendorf Reise*, 1, pt. ii. 24 (1856).

Acer Dedyle, Maximowicz, *Bull. Phys. Math. Acad. Sci. St. Pétersbourg*, xv. 125 (1856); *Mél. Biol.* ii. 414.

Acer spicatum, Regel, *Bull. Phys. Math. Acad. Sci. St. Pétersbourg*, xv. 217 (not Lamarck) (1856); *Mél. Biol.* ii. 483. — Miquel, *Arch. Néerl.* ii. 470, 477.

Acer spicatum, var. *Ukurunduense*, Maximowicz, *Mém. Sav. Étr. Acad. Sci. St. Pétersbourg*, ix. 65 (*Prim. Fl. Amur.*) (1859); *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 439; *Mél. Biol.* x. 594. — Fr. Schmidt, *Mém. Acad. Sci. St. Pétersbourg*, sér. 7, xii. pt. ii. 36, 119 (*Fl. Sachalinensis*). — Franchet & Savatier, *Enum. Pl. Jap.* i. 88. — Nicholson, *Gard. Chron.* new ser. xv. 172, f. 29. — Pax, *Engler Bot. Jahrb.* vii. 189; *Engler Pflanzenreich*, Heft 8 (iv. 163), 16.

Leaves deciduous, from 6 to 12 centimetres long, usually broader than wide, membranaceous, cordate or subcordate at the base, glabrous above, and villous-pubescent only along the veins, the lobes triangular-ovate, conspicuously longer than broad, acuminate, coarsely and incisely serrate; their petioles puberulous or glabrescent; style about 2 millimetres long, divided at the apex only or sometimes to below the middle into two stigmas. Wings of the fruit spreading at a narrow angle or nearly upright, with the puberulous nutlet 2 centimetres or less long, from 6 to 7 millimetres broad and usually broadest above the middle, and narrowed toward the apex. Branchlets pubescent while young, rarely glabrescent, usually without or with a few lenticels.

Eastern Siberia: Mandshuria, *Schrenck*, 1855 (type of *Acer Dedyle*), *Maximowicz, Korshinsky*, 1891; mountains east of Harbin, *C. S. Sargent*, August, 1903. In Saghalin and Japan.

Acer caudatum is most nearly related to the American *Acer spicatum*, Lamarck, and is chiefly distinguished from that species by its five or sometimes seven-lobed leaves and by the puberulous fruits. The variety *Ukurunduense* is still more closely related to *Acer spicatum* in the pubescent under surface of the leaves. The typical *Acer caudatum* of Sikkim seems at the first glance less closely related to its variety *Ukurunduense* than the latter is to the American *Acer spicatum*, but there appears to be no constant character by which the varieties of *Acer caudatum* can be separated except the serration of the leaves, and this can hardly be considered sufficient to distinguish them specifically, especially as it is variable and not a concomitant of the pubescence.

Acer caudatum, var. *Prattii*, and *Acer caudatum*, var. *erosum*, which are nearest alike in the serration of their leaves, differ in pubescence, the first having about the same sort of pubescence as *Acer caudatum*, var. *Ukurunduense*, although these varieties represent the extremes in regard to the serration of the leaves, while the type, which is nearly as deeply serrate as the variety *Ukurunduense*, agrees in pubescence with the variety *erosum*. *Acer caudatum*, var. *Ukurunduense*, varies itself in pubescence; a Japanese specimen from Mt. Komagatake (ex Sci. Coll. University of Tokio, August 2, 1886) is pubescent only along the veins and has glabrous branchlets exactly like the variety *erosum*, and is almost indistinguishable from Wilson's No. 2363, which differs from the other specimens which I have seen in the more elongated and somewhat more coarsely serrate lobes of the leaves. No character, therefore, appears available to separate any of the forms of *Acer caudatum* as species, and it is reasonable to expect that future collections from these regions will furnish additional intermediate forms.

A rather remarkable fact is the variability of the style. To my knowledge no such variation has been observed in any other Maple. In the typical form the long style is divided at the apex into two very short stigmas (f. 4); the style divided to below the middle into two very long recurved stigmas (f. 3) seems to be less common, as among all those that I have examined I have found it only in two specimens (Japan: Hondo, prov. Senano and Nambu, *Tschonoski*, 1864. Hokkaido, Sapporo, *K. Miyabe*, June 14, 1882).

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate LXXXII. Acer caudatum, var. Ukurunduense.

1. A flowering branch, natural size.
2. A staminate flower, enlarged.
3. A pistillate flower, enlarged (the form with deeply divided style).
4. A pistillate flower with the sepals and petals removed (the normal form).
5. A fruiting branch, natural size.
6. A single fruit, natural size.
7. An embryo, enlarged.
8. A fruit of *Acer caudatum*, natural size.
9. A fruit of *Acer caudatum*, var. *Prattii*, natural size.
10. A leaf of *Acer caudatum*, var. *Prattii*, natural size.
11. A fruit of *Acer caudatum*, var. *multiserratum*, natural size.

C. E. Faxon del.

ACER CAUDATUM, var. UKURUNDUENSE, Rehd.

ACER DAVIDI, Franch.

Acer Davidi, Franchet, *Nouv. Arch. Mus. Hist. Nat. Paris*, sér. 2, viii. 212 (*Pl. David.* ii. 30) (1884); *Pl. Delavayanæ*, 145; *Bull. Soc. Bot. France*, xxxiii. 464. — Pax, *Engler Bot. Jahrb.* vii. 216; *Engler Pflanzenreich*, Heft 8 (iv. 163), 36. — Henry, *Gard. Chron.* ser. 3, xxxiii. 62.

Acer Hookeri, Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 140 (not Miquel) (1886).

Acer Sikkimense, subsp. Davidi, Wesmael, *Bull. Soc. Bot. Belg.* xxix. 44 (1890).

Acer Davidi tomentellum, Schwerin, *Gartenflora*, xlii. 230 (1893).

Leaves deciduous, membranaceous, ovate to oblong-ovate, from 7 to 18 centimetres long, acuminate, subcordate or sometimes rounded at the base, unequally crenate-serrate, pinnately veined, with a pair of prominent veins at the base, dark yellowish green above, pale green beneath, and rufously villous on the veins while young, usually glabrous or nearly so at maturity; their petioles from 2 to 4 centimetres long, and rufously villous while young. Flowers yellowish, apparently andro-monœcious, in slender pendulous racemes on short glabrous or rufously villous peduncles from terminal or sometimes lateral buds, with one pair of leaves at the base; staminate flowers on pedicels from 2 to 3 millimetres long, in seven to ten-flowered racemes from 3 to 4 centimetres in length; sepals elliptic, obtuse, from 4 to 4.5 millimetres long; petals about as long as the sepals, obovate; stamens eight, about half as long as petals; anthers broadly oval; disk intrastaminal, slightly eight-lobed; rudimentary pistil minute; pistillate flowers on pedicels from 6 to 8 millimetres long, in ten to fifteen-flowered racemes from 5 to 7 centimetres in length; sepals five, elliptic, 4 millimetres long, obtuse; petals obovate to elliptic-obovate, of equal length; ovary rufously villous; style short, from 1 to 1.5 millimetres long, with slender spreading stigmas; abortive stamens short. Fruits light yellowish brown on pedicels from 6 to 8 millimetres long, in pendulous racemes from 6 to 10 centimetres in length; nutlet about 8 millimetres long and 5 millimetres broad; wings spreading almost horizontally, with the nutlet from 2.5 to 3.5 centimetres long, about 1 centimetre broad; embryo with accumbent and nearly flat cotyledons.

A tree from 10 to 15 metres high; branchlets smooth and slender, light yellowish brown or purple, glabrous while young; winter-buds oblong, acute, stalked, with one pair of outer valvate scales and one pair of accrescent inner scales puberulous on the inner surface. Flowers appearing with the leaves in May. Leaves turning bright yellow or purple in autumn.

Central China: Hupeh, *Henry* (Nos. 3716, 5356, 5643, 5827, 6910), *E. H. Wilson* (Nos. 299, 299 A, 1218, 1218 A); Szechuen, *Henry* (Nos. 5643 ex Pax, 7199), *Rosthorn* (ex Pax); Kweichow, *Rosthorn* (ex Pax); Kwangsi (ex Forbes & Hemsley); east Tibet, Moupine, *David* (ex Franchet).

Acer Davidi is most closely related to *Acer Hookeri*, Miquel, from which it is easily distinguished by the crenulate serration of the leaves, the rufous hairs on their veins beneath, and by the larger fruits. From the entire-leaved form of *Acer cratægifolium*, Siebold & Zuccarini, it differs in the crenulate serration, with obtusish teeth, the generally larger leaves, stouter petioles, broader sepals and petals, and larger fruits. Pax distinguishes the two following varieties: —

Acer Davidi, var. glabrescens, Pax, *Hooker Icon.* xix., under t. 1897 (1889); *Engler Pflanzenreich*, Heft 8 (iv. 163), 36. — Schwerin, *Gartenflora*, xlii. 230.

Hupeh, *Henry* (No. 7085); Kweichow, *Rosthorn* (ex Pax); Szechuen, *Rosthorn* (ex Pax).

Leaves glabrous at maturity.

ACER DAVIDI, var. γ HORIZONTALE, Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 79 (1902).
Leaves glabrous at maturity, large; wings of the fruit nearly horizontal, hyaline.
Schensi, *Giraldi* (No. 2109 ex Pax); Hupeh, *E. H. Wilson* (No. 1882).
Another peculiar form is Wilson's No. 299. This has rather small nearly glabrous leaves, and small fruits, with nearly horizontal sometimes slightly recurved wings, and nutlets about 2 centimetres long and from 7 to 8 millimetres broad.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE LXXXIII. ACER DAVIDI.

1. A flowering branch with staminate flowers, natural size.
2. A staminate flower, enlarged.
3. A flowering branch with pistillate flowers, natural size.
4. A pistillate flower, enlarged.
5. A fruiting branch, natural size.
6. An embryo, enlarged.
7. An embryo, enlarged.

C. E. Faxon del.

ACER DAVIDI, Franch.

ACER UROPHYLLUM, MAXIM.

ACER UROPHYLLUM, Maximowicz, *Act. Hort. Petrop.* xi. 105 (1890).

ACER MAXIMOWICZII, Pax, *Hooker Icon.* xix., under t. 1897 (1889); Engler, *Pflanzenreich*, Heft 8 (iv. 163), 70. — Henry, *Gard. Chron.* ser. 3, xxxiii. 100.

Leaves deciduous, membranaceous, ovate to oblong-ovate in outline, from 5 to 8 centimetres long, from 3.5 to 5.5 centimetres broad, palmately three to five-veined, subcordate or sometimes truncate at the base, usually five-lobed, dark yellowish green above, glaucescent beneath, with axillary tufted hairs, otherwise glabrous, sharply and doubly serrate, with acuminate teeth, the two basal lobes very small and acute, the lateral lobes triangular-ovate, spreading, acuminate, the middle lobe elongated, caudate, often slightly incisely lobed; their petioles slender, from 4 to 6 centimetres long, and glabrous. Flowers apparently andro-dioecious, yellowish, in slender pendulous glabrous six to ten-flowered racemes terminal on leafy branchlets, and with the peduncle from 4 to 6 centimetres in length; staminate flowers on pedicels from 2 to 3 millimetres long, their bracts reduced to tufts of hairs; sepals five, oblong, 3 to 4 millimetres long, obtuse; petals five, of about equal length, slightly narrower than the sepals; stamens eight, somewhat shorter than the petals; anthers broadly oval; disk intrastaminal, slightly eight-lobed, with a minute rudimentary pistil in the middle; pistillate flowers on pedicels from 3 to 6 millimetres long; sepals five, elliptic, 3 millimetres long, obtuse; petals slightly longer, oblong, obtuse; disk lobed; stamens present, short; style short, with slender recurved stigmas. Fruits light brownish yellow, in pendulous three to eight-fruited racemes from 4 to 6 centimetres long; nutlets from 5 to 6 millimetres long, somewhat compressed; wings spreading at a very obtuse angle or nearly horizontal, with the nutlet from 2 to 2.5 centimetres long, about 8 millimetres broad; embryo with incumbent irregularly conduplicate cotyledons.

A small tree, with smooth purple or sometimes light yellowish brown glabrous branches; winter-buds small, yellowish, stalked, with one pair of outer valvate scales. Flowers appearing in May with the leaves which apparently turn yellow in autumn.

Central China: Hupeh, *Henry* (Nos. 6783, 6857), *E. H. Wilson* (Nos. 1891, 2343); Shensi, Changyang, *E. H. Wilson* (No. 724); Kansu, *G. N. Potanin* (ex Maximowicz); Honan, *Henry* (No. 7557).

Acer urophyllum seems most closely related to *Acer Tschonoskii*, Maximowicz, from which it differs chiefly in the much elongated and caudate middle lobe of the leaves, the shorter pedicels, and broader sepals and petals. From *Acer pectinatum*, Wallich, it differs in the smaller leaves glaucous beneath, with coarser more appressed and irregular serratures. It also resembles in foliage the three-leaved form of *Acer cratægifolium*, Siebold & Zuccarini. This may be distinguished by the young leaves which are rufously villous along the veins beneath, by the shorter not acuminate lobes of the leaves, and by the nutlets which are much longer than broad.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE LXXXIV. ACER UROPHYLLUM.

1. A flowering branch with staminate flowers, natural size.
2. A staminate flower, enlarged.
3. A flowering branch with pistillate flowers, natural size.
4. A pistillate flower enlarged.
5. A pistillate flower with the petals and sepals removed, enlarged.
6. A fruiting branch, natural size.
7. An embryo, enlarged.

C. E. Faxon del.

ACER UROPHYLLUM, Maxim.

ACER TETRAMERUM, PAX.

ACER TETRAMERUM, Pax, *Hooker Icon.* xix., under t. 1897 (1889); *Engler Pflanzenreich*, Heft 8 (iv. 163), 73.

ACER BETULIFOLIUM, Maximowicz, *Act. Hort. Petrop.* xi. 108, in part (1890). — Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 10, in part.

Leaves deciduous, membranaceous, ovate to oblong-ovate, from 5 to 8 centimetres long, from 2.5 to 5 centimetres broad, cuspidate-acuminate, truncate or rounded at the base, unequally incisely serrate or slightly lobed, with four to six pairs of lateral veins, dull yellowish green and glabrous or nearly so above, lighter green and thinly pubescent beneath, with axillary tufts of whitish hairs, or rarely glabrescent; their petioles slender, from 1.5 to 4 centimetres long, and glabrous or slightly pubescent toward the apex. Flowers diœcious, greenish yellow, glabrous, on slender pedicels about 1 centimetre long, in glabrous slender racemes; staminate flowers in three to five-flowered nearly sessile umbel-like racemes from lateral leafless buds; sepals four, ovate to oblong-ovate, obtuse, 3 millimetres long; petals four, oblong, of nearly equal length; stamens four, sometimes six or rarely three, about one third longer than the petals; anthers oval; disk intrastaminal, two-lobed, with irregularly furrowed lobes, or sometimes with two additional minute lobes in the flowers with six stamens; pistillate flowers on slender pedicels from 0.6 to 2 centimetres long, with minute bracts at the base, in four to eight-flowered racemes, with the rather short peduncle 3 to 4 centimetres long, terminal on short lateral two-leaved branchlets; sepals four, oval, 3 millimetres long, obtuse; petals oblong and slightly longer than the sepals; disk conspicuous; rudimentary stamens wanting; ovary glabrous; style about 1 millimetre long, with slender recurved stigmas. Fruits on slender pedicels from 1 to 2.5 centimetres long, in pendulous four to eight-fruited racemes 6 to 10 centimetres in length; nutlets compressed, about 8 millimetres long and from 6 to 7 millimetres broad, with one to three prominent longitudinal ridges; wings spreading at about right angles, with the nutlets 2.5 to rarely 4 centimetres long, and from 7 to 9, to rarely 14, millimetres broad; embryo with irregularly folded accumbent cotyledons.

A tree from 5 to 8 metres high; branchlets smooth, without lenticels, light yellowish or greenish brown often tinged with purple, and quite glabrous even while young; winter-buds small, ovoid, glabrous, and stalked, with one outer pair of valvate purplish scales, the inner pair leafy, accrescent, obovate-oblong, yellowish, pubescent only near the acutish apex. Flowers appearing with the leaves in May.

Central China: Hupeh, *Henry* (Nos. 5313, type!, 515), *E. H. Wilson* (No. 298); Szechuen, *Henry* (No. 8799), Nanto, *E. H. Wilson* (No. 1233, Herb. Kew).

Acer tetramerum is closely related to *Acer betulifolium*, Maxim., and to *Acer stachyophyllum*, Hiern.[1] From the first it is distinguished by the five-nerved leaves usually rounded at the base and by the fruits spreading at right angles, while the leaves of *Acer betulifolium* are triangular-ovate, three-nerved, and often broadly cuneate at the base, and the fruits spread at an obtuse angle; from the second it differs chiefly in the short appressed grayish pubescence on the under side of the leaves, the smaller fruits, and shorter racemes, while *Acer stachyophyllum* has large distinctly ovate leaves, subcordate at the base, densely villous beneath, dark green and glabrous above, and fruits about 4.5 centimetres long and distinctly stipitate, in longer, nine to fifteen-fruited racemes. Though the leaves in Henry's No. 5313 are not yet fully unfolded, a careful examination shows that they scarcely differ in shape and pubescence from his No. 515, and the staminate flowers agree perfectly with the staminate specimen of Wilson's No. 298; and the differences

[1] See also Henry, *Gard. Chron.* ser. 3, xxxiii. 62, who refers Wilson's specimens to *Acer stachyophyllum*.

appearing in Pax's description are easily accounted for by the fact that the flowers of Henry's No. 5313 are not yet fully developed. *Acer tetramerum* appears to be a rather variable species; of the several specimens before me (Wilson's No. 298 consists of several branches undoubtedly from different trees), only Wilson's pistillate specimen matches Henry's No. 515 exactly in foliage. Henry's No. 8799, which had been referred by Pax to *Acer stachyophyllum*, Hiern, differs in the more densely grayish pubescence on the under surface of the leaves, while Wilson's fruiting specimen has the leaves distinctly, though slightly, incisely lobed, and in his staminate specimen (in the collection at the Arnold Arboretum) they are still more deeply lobed and at the same time nearly glabrous beneath. Wilson's staminate specimen in the Kew Herbarium is pubescent beneath and agrees nearly with his fruiting specimen. Wilson's No. 1233 again approaches *Acer stachyophyllum*, Hiern, in its large fruits, about 4 centimetres long and 14 millimetres broad, with upright wings, but the leaves are only thinly covered with appressed hairs on the lower surface.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE LXXXV. ACER TETRAMERUM.

1. A flowering branch of the staminate tree, natural size.
2. A staminate flower with 4 stamens, enlarged.
3. A staminate flower with 6 stamens, enlarged.
4. A flowering branch of the pistillate tree, natural size.
5. A pistillate flower, enlarged.
6. An ovary, enlarged.
7. A fruiting branch, natural size.
8. A fruit, enlarged.
9. An embryo, enlarged.

C. E. Faxon del.

ACER TETRAMERUM, Pax

ACER BARBINERVE, MAXIM.

ACER BARBINERVE, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg,* xii. 227 (1870); xxvi. 439; *Mél. Biol.* vi. 369; x. 593. — Nicholson, *Gard. Chron.* new ser. xv. 726. — Pax, *Engler Bot. Jahrb.* vii. 252; *Engler Pflanzenreich,* Heft 8 (iv. 163), 72. — Koehne, *Deutsche Dendr.* 383.

ACER DIABOLICUM, subsp. BARBINERVE, Wesmael, *Bull. Soc. Bot. Belg.* xxix. 63 (1890).

Leaves deciduous, membranaceous, roundish or broadly ovate in outline, from 6 to 9 centimetres long, from 4.5 to 9 centimetres broad, five-lobed, cordate at the base, nearly glabrous above, and hirsute-pubescent beneath especially on the veins and furnished with tufted axillary hairs, their lobes broadly triangular-ovate, separated by very narrow acute sinuses reaching scarcely half way to the middle, coarsely and doubly dentate-serrate, long-acuminate, the middle lobe with five to six pairs of lateral veins, the lower lobes much smaller, acute, with few coarse teeth; their petioles slender, from 4 to 9 centimetres long, sparingly puberulous while young, nearly glabrous at maturity. Flowers dicœcious, 4-merous, yellowish, on pedicels in the axils of small caducous bracts, in nodding racemes from lateral leafless buds; staminate racemes very short, five to six-flowered, forming a nearly sessile fascicle about 1.5 centimetres long; sepals elliptic-oblong, 5 millimetres long, often irregularly toothed and occasionally furnished with a few hairs at the apex; petals somewhat shorter than the sepals, rhombic-obovate, contracted at the base into a distinct claw, often slightly toothed toward the apex; stamens four, about as long as the sepals, inserted between the lobes of the intrastaminal four-lobed disk, its lobes irregularly furrowed; rudimentary ovary none; pistillate racemes with the slender peduncle about 4 centimetres long, puberulous, usually seven-flowered; sepals oblong, 4.5 millimetres long, ciliate, with long hairs at the apex; petals nearly as long as the sepals, obovate, distinctly clawed; ovary glabrous, stipitate; style 2 millimetres long, with spreading stigmas of about equal length; disk present; rudimentary stamens none. Fruits pale brownish yellow, in six or seven-fruited drooping racemes, four or five centimetres long, on peduncles about 2 centimetres in length; nutlets reticulate, about 1 centimetre long and 8 millimetres broad, with thick woody walls; wings spreading at an obtuse angle, straight, with the nutlet 3.5 centimetres long, 11 millimetres broad above the middle, and obtuse at the apex; embryo with accumbent irregularly conduplicate cotyledons.

A shrubby tree, with smooth brown bark; young branchlets puberulous, becoming nearly glabrous and dull reddish brown in their second year, without lenticels; winter-buds with two pairs of scales, the inner ones accrescent. Flowers appearing with the leaves.

Southeastern Manchuria, *Maximowicz,* 1860.

Acer barbinerve is most closely related to *Acer argutum,* Maximowicz, from which it is easily distinguished by its coarsely serrate leaves, the clawed petals, and the larger fruits in shorter racemes, and to *Acer tetramerum,* Pax, from which it differs in its five-lobed leaves, in the clawed obovate petals, and in the larger fruits.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate LXXXVI. Acer barbinerve.

1. A flowering branch of a staminate tree, natural size.
2. A staminate flower, enlarged.
3. A flowering branch of a pistillate tree, natural size.
4. A pistillate flower, enlarged.
5. A fruiting branch, natural size.
6. An embryo, enlarged.

ACER FRANCHETI, Pax.

Acer Francheti, Pax, *Hooker Icon.* xix., under t. 1897 (1889); *Engler Pflanzenreich*, Heft 8 (iv. 163), 71.—Henry, *Gard. Chron.* ser. 3, xxxiii. 100.

Acer villosum, Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 142 (not Wallich) (1886).

Leaves deciduous, chartaceous, palmately three-lobed or sometimes with two smaller lobes near the cordate or subcordate base, ovate in outline, loosely pubescent along the veins while young or pubescent over the whole under surface, and at maturity nearly glabrous or pubescent beneath, dark yellowish green above, light green and reticulate-venulose beneath, from 8 to 11 centimetres long and from 7 to 10 centimetres broad, the lobes pointing forward, broadly triangular-ovate, acute, remotely and irregularly toothed; their petioles from 5 to 10 centimetres long, appressed-pubescent above, especially toward the apex. Flowers dicœcious, yellowish green, about 1 centimetre broad, appearing before or with the leaves from lateral leafless buds in slender drooping appressed-pubescent racemes; staminate flowers on slender pedicels from 1.5 to 5 millimetres long, with small oblong villous bracts at the base, in seven to thirteen-flowered racemes from 4 to 6 centimetres in length; sepals and petals ten, of almost equal length, oblong to narrow-oblong, 4.5 millimetres long, obtuse, ciliate; stamens eight or rarely ten, inserted near the margin of the disk, slightly longer than the petals; anthers oval; ovary reduced to a tuft of hairs in the middle of the disk; pistillate flowers on pedicels from 1 to 2 centimetres long, with minute ovate bracts at the base, in five to seven-flowered racemes from 4 to 5 centimetres in length; sepals and petals usually ten, obovate-elliptic or elliptic, about 4 millimetres long, obtuse, ciliate; stigmas nearly sessile; ovary appressed-pilose. Fruits on rather stout slightly pubescent pedicels from 1 to 2 centimetres long, in five to seven-fruited pendulous racemes; nutlets thick, cristate-reticulate, sparingly appressed-pilose, about 1 centimetre long and broad; wings spreading at right angles or nearly upright, from 16 to 18 millimetres broad and with the nutlet 5 centimetres long; embryo with twice conduplicate incumbent cotyledons.

A tree, 4 metres high (according to Henry); young branchlets glabrous, becoming dark brown and marked by small oval lenticels; winter-buds ovate, pointed, with about twelve imbricate pairs of ovate acute scales, the outer dull brown and nearly glabrous or appressed-pubescent near the apex, the inner scales densely rufous-pubescent, those of the two innermost pairs finally much elongated and narrow-oblong. Flowers appearing at the end of April (in Patung). Fruit ripens in October.

Central China: Hupeh, *Henry* (Nos. 6456, type !, 6894), *E. H. Wilson*, Patung (near Hoang-Po, 5800 ft. alt.), April 25, 1900 (No. 91); Szechuen, *Rosthorn* (No. 336 ex Pax).

Acer Francheti is closely related to *Acer villosum*, Wallich, and *Acer Thomsoni*, Miquel, differing from them chiefly in its few-flowered simple racemes. Wilson's specimens differ from the type in having the leaves nearly glabrous on the under surface except on the veins, in the pair of small lobes near their base, and in their more coarsely and irregularly dentate margins. In the last character it approaches *Acer villosum*, Wallich, while in the glabrescent leaves and the simple raceme it approaches *Acer Thomsoni*, Miquel.

Cultivated in the Veitchian Nurseries.[1]

Alfred Rehder.

Arnold Arboretum.

[1] THE MAPLES OF EASTERN CONTINENTAL ASIA.

CONSPECTUS OF THE SECTIONS AND SPECIES.

Inflorescence andro-polygamous (monoclinous and staminate flowers in the same inflorescence), compound, terminal on leafy branchlets; flowers 5-merous; disk extrastaminal.

*** Leaves palmately lobed or only occasionally undivided.**

+ Inflorescence corymbose.

++ Lobes of the leaves entire or occasionally coarsely toothed, 3–7; nutlets much flattened, smooth.

i. Platanoidea.

Wings of the fruit 1½ to twice as long as the nutlet.
Leaves truncate at the base, 5–7-lobed, glabrous; wings of the fruit broad, only slightly longer than the nutlets. 1. A. TRUNCATUM.
Leaves subcordate or rounded at the base; wings of the fruit about twice as long as the nutlets. 2. A. PICTUM.
Wings of the fruit 2–4 times as long as the nutlets.
Leaves 5–7-lobed or sometimes 3-lobed, glabrous or tomentose beneath. 3. A. LÆTUM.
Leaves partly 3-lobed and partly undivided.
Leaves with acute or obtusish lobes, quite glabrous; inflorescence small. 4. A. TENELLUM.
Leaves with caudate lobes, pubescent beneath; inflorescence large and loose. 5. A. LONGIPES.

++++ Lobes of the leaves sharply serrate, 7–11; inflorescence few-flowered; nutlets convex, rather smooth. ii. PALMATA.
Petioles and peduncles densely villous; lobes of the leaves incisely doubly serrate. 6. A. SIEBOLDIANUM.
Petioles and peduncles glabrous or nearly so; lobes of the leaves sharply serrate.
Wings of the fruit with the nutlets 1–2 centimetres long, spreading at an obtuse angle. 7. A. PALMATUM.
Wings of the fruit with the nutlets 3.5–4 centimetres long, horizontally spreading. 8. A. ROBUSTUM.

+–+– Inflorescence paniculate. iii. SPICATA.
a Leaves 5–7-lobed (3-lobed in No. 13), the lobes acuminate; wings of the fruit usually horizontally spreading.
b Petals oval to elliptic, scarcely longer than the sepals.
c Leaves usually 5-lobed, truncate or with an open cordate base.
Panicle corymbiform, many-flowered.
Leaves sharply serrulate, glabrous beneath; wings of the fruit spreading nearly horizontally. 9. A. OLIVERIANUM.
Leaves crenulate-dentate, pubescent on the veins beneath, the basal lobes very small; wings of the fruits erect. 10. A. GIRALDII.
Panicle elongated.
d Sepals glabrous or but slightly villous on the inner surface.
e Leaves 5–7-lobed.
Leaves green beneath, often 7-lobed, the lobes entire or serrulate; style about as long as the stigmas. 11. A. CAMPBELLI.
Leaves glaucous or glaucescent beneath, 5-lobed.
Lobes of the leaves obtusely crenulate-serrate; sepals obovate; style divided to the base; wings of the fruit with the nutlets 4–5 centimetres long. 12. A. CÆSIUM.
Lobes of the leaves sparingly serrulate towards the apex; sepals triangular-oblong; style divided only at the apex; wings with the nutlets about 3 centimetres long. 13. A. SINENSE.
ee Leaves 3-lobed, with sparingly serrate or nearly entire lobes. 14. A. WILSONI.
dd Inner surface of the sepals and the ovary densely villous; panicle cylindric, rather compact; leaves sharply serrate. 15. A. ERIANTHUM.
cc Leaves 7 or rarely 5-lobed, deeply cordate at the base; sharply serrate; panicles glabrous, nodding; wings of the fruit 2.5 centimetres long, spreading horizontally. 16. A. FLABELLATUM.
bb Petals linear-oblong, much longer than the sepals; inflorescence cylindric, upright. 17. A. CAUDATUM.
aa Leaves 3-lobed or sometimes undivided; wings of the fruit upright or spreading at a right angle.
Leaves always 3-lobed, with an elongated middle lobe, incisely serrate and membranaceous. 18. A. GINNALA.
Leaves undivided or 3-lobed, with short entire or sparingly serrate lobes.
Leaves membranaceous or chartaceous, green or rarely glaucescent beneath; lobes of almost equal length; wings of the fruit erect or spreading. 19. A. BUERGERIANUM.
Leaves coriaceous, glaucous beneath, the middle lobe several times longer than the lateral lobes, wings of the fruit spreading at a right angle. 20. A. PAXII.

** Leaves undivided, coriaceous, mostly persistent; inflorescence short-paniculate; nutlets convex. iv. INTEGRIFOLIA.
a Leaves quite entire.
Leaves distinctly 3-nerved at the rounded base, usually glaucous beneath; inflorescence pubescent. 21. A. OBLONGUM.
Leaves not 3-nerved at the more or less cuneate base.
Inflorescence pedunculate; leaves green on both surfaces, their petioles short.
Leaves distinctly reticulate. 22. A. LÆVIGATUM.
Leaves not reticulate, caudate; inflorescence purplish. 23. A. FARGESI.
Inflorescence sessile; leaves green or glaucescent beneath; their petioles slender. 24. A. LANCEOLATUM.
aa Leaves more or less serrate or dentate, especially toward the apex, rounded to cordate at the base.
Leaves green beneath, cordate at the base, sparingly serrulate. 25. A. CORDATUM.
Leaves glaucous beneath, rounded or subcordate at the base, sparingly dentate or sometimes slightly lobed. 26. A. DISCOLOR.

Inflorescence andro-monœcious or dicœcious (staminate and monoclinous or pistillate flowers on different inflorescences), consisting of simple racemes, rarely branched near the base.

* Leaves palmately lobed or undivided, serrate or serrulate; disk intrastaminal.
+– Staminate and pistillate inflorescence terminal on leafy branchlets; nutlets flattened; winter-buds with two

outer valvate scales, usually stalked; flowers monœcious (always ?).

Leaves undivided or but slightly lobed.

v. INDIVISA.

Leaves quite glabrous when young; fruits nearly sessile. 27. A. SIKKIMENSE.

Leaves rufously villous along the veins beneath, at least when young; fruits distinctly stalked.

Leaves serrulate, not lobed, acuminate, rounded or subcordate at the base, caudate.

28. A. DAVIDI.

Leaves serrate and slightly lobed, the lobes cordate at the base.

29. A. LAXIFLORUM.

Leaves palmately 3 or sometimes 5-lobed.

vi. MACRANTHA.

Leaves roundish-ovate in outline, with short acuminate doubly serrate lobes and shallow sinuses.

Leaves rounded or subcordate at the base, 8–12 centimetres long. 30. A. FULVESCENS.

Leaves cordate at the base, 5–6 centimetres long. 31. A. GROSSERI.

Leaves elongated, with caudate incisely serrate lobes and acute deep sinuses.

32. A. CROPHYLLUM.

++ Staminate inflorescence from lateral leafless buds; nutlets convex, reticulate, with firm woody walls; flowers dicœcious (always ?).

+ Flowers 4-merous; stamens 4–6; pistillate inflorescences from terminal leafy branches, winter-buds with one pair of valvate outer scales.

vii. ARGUTA.

Leaves undivided or slightly lobed; petals elliptic-oblong.

Leaves 5-nerved and usually rounded at the base; pubescent or glabrescent beneath; fruits spreading at a right angle.

33. A. TETRAMERUM.

Leaves 3-nerved and often truncate at the base, with scattered appressed hairs beneath, or glabrescent; wings of the fruit spreading at an obtuse angle. 34. A. BETULIFOLIUM.

Leaves palmately 5-lobed; petals elliptic, obovate, clawed. 35. A. BARBINERVE.

++ Flowers 5-merous, stamens 8–10; pistillate inflorescence like the staminate from lateral leafless branchlets; leaves 3–5-lobed; winter-buds with numerous decussate outer scales.

viii. LITHOCARPA.

Leaves 3–5-lobed, with broad and very short lobes.

Inflorescence racemose, short-peduncled; sepals ciliate. 36. A. FRANCHETI.

Inflorescence capitate-racemose, long-peduncled; sepals and petals ciliate.

37. A. SCHOENERMARKIE.

Leaves deeply 3-lobed, with coarsely toothed or nearly entire lobes; inflorescence few-flowered fascicle-like. 38. A. PILOSUM.

+ Leaves 3-foliolate; inflorescence terminal; disk extrastaminal; winter-buds with several pairs of outer decussate scales. ix. TRIFOLIATA.

+ Inflorescence and leaves glabrous or nearly so; leaves oblong-lanceolate.

Inflorescence compound, many-flowered; stamens exserted. 39. A. SUTCHUENSE.

Inflorescence simple, few-flowered; stamens not exserted. 40. A. MANDSCHURICUM.

++ Inflorescence and leaves pilose; inflorescence few-flowered; fruits densely pubescent.

Leaflets serrate or dentate; flowers on slender pedicels.

Leaflets elliptic-oblong to oblong-lanceolate, 7–13 centimetres long, sparingly and obscurely serrate.

Petioles reaching 5 centimetres in length, slightly pilose. 41. A. TRIFLORUM.

Petioles short, 2–3.5 centimetres long, densely pilose. 42. A. NIKOENSE.

Leaflets elliptic to elliptic-lanceolate, 4–6 centimetres long, coarsely dentate. 43. A. GRISEUM.

Leaflets mostly entire; flowers sessile.

44. A. HENRYI.

ENUMERATION OF THE SPECIES.

I. PLATANOIDEA.

1. ACER TRUNCATUM, Bunge. See p. 151, t. 76.

2. ACER PICTUM, Thunberg, *Fl. Jap.* 162 (1784); *Icon. Fl. Jap.* t. 4. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 443; *Mél. Biol.* x. 599. — Pax, *Engler Bot. Jahrb.* vii. 235; *Engler Pflanzenreich*, Heft 8 (iv. 163), 47. — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 141. — Shirasawa, *Icon. Ess. For. Jap.* i. 105, t. 65.

Japan.

ACER PICTUM, var. MONO, Pax, *Engler Bot. Jahrb.* vii. 236 (1886); *Engler Pflanzenreich*, Heft 8 (iv. 163), 47.

Acer Mono, Maximowicz, *Bull. Phys. Math. Acad. Sci. St. Pétersbourg*, xv. 126 (1857); *Mél. Biol.* ii. 416.

Acer lætum, γ *parviflorum*, Regel, *Bull. Phys. Math. Acad. Sci. St. Pétersbourg*, xv. 219 (not *Acer parviflorum*, Ehrhart) (1857); *Mél. Biol.* ii. 486.

Acer pictum, γ, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 443 (1880); *Mél. Biol.* x. 600.

Eastern Siberia: Amurland, *Maack*, 1855, *L. Schrenk*, 1855, *Maximowicz*, *Korshinsky*, 1891, east of Harbin, *C. S. Sargent*, August, 1903, Vladivostock and Khabarovka, *C. S. Sargent*, August, 1903; Saghalin, *Brylkin*, 1860.

China: Chihli and Manchuria (ex Forbes & Hemsley); Hupeh, *E. H. Wilson* (Nos. 234, 1169), *Henry* (No. 5480).

Japan: Hokkaido and Hondo.

3. ACER LÆTUM, C. A. Meyer, *Verz. Kaukas. Pflanz.* 206 (1831). — Zabel, *Gartenflora*, xlii. 459. — Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 48.

Acer Lobelii, Ledebour, *Fl. Ross.* i. 456 (not Tenore) (1842). — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 140.

Acer pictum, K. Koch, *Ann. Mus. Lugd. Bat.* i. 251, in part, (not Thunberg) (1864).

Acer Lobelii, subsp. *lætum*, Pax, *Engler Bot. Jahrb.* vii. 237 (1886).

Acer Lobelii, var. *Colchicum*, Pax, *Engler Bot. Jahrb.* vii. 237 (1886). — Franchet, *Pl. Delavayanæ*, 144; *Bull. Soc. Bot. France*, xxxiii. 463.

China: Chihli (ex Franchet); Hupeh, *Henry* (No. 5410), *E. H. Wilson* (Nos. 551, 885, 2706); Yun-nan (ex Franchet).

Western Asia.

ACER LÆTUM, var. CULTRATUM, Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 48 (1902). — Henry, *Gard. Chron.* ser. 3, xxxiii. 100.

Acer cultratum, Wallich, *Pl. As. Rar.* ii. 4 (1831).

Acer sterculiaceum, Griffith, *Notes*, 148 (not Wallich) (1848).

Acer pictum, Brandis, *Forest Fl. Brit. Ind.* 112 (not Thunberg) (1874). — Hiern, *Hooker f. Fl. Brit. Ind.* i. 696.

Acer Lobelii, subsp. *lætum*, var. *Indicum*, Pax, *Engler Bot. Jahrb.* vii. 237 (1886).

Acer lætum, var. *Indicum*, Schwerin, *Gartenflora*, xlii. 459 (1893).

China: Hupeh, *E. H. Wilson* (Nos. 287, 605); Szechuen (ex Pax); Yun-nan, *Henry* (No. 10872).

Himalayas.

Cultivated in the Veitchian Nurseries.

ACER LÆTUM, var. TRICAUDATUM, *n. var.*

Leaves rounded at the base, from 5 to 7 centimetres long, from 6 to 8 centimetres broad, three-lobed, with triangular-ovate caudate lobes, glabrous; fruits light brown; nutlets about 8 millimetres long and 6 millimetres broad; wings spreading at right angles, with the nutlets about 3 centimetres long.

China: Hupeh, *E. H. Wilson* (No. 234 A).

This variety is chiefly distinguished by its three-lobed rather small leaves which give the plant a very distinct appearance.

ACER LÆTUM, var. TOMENTOSULUM, *n. var.*

Young leaves covered beneath with a dense whitish tomentum, three to five-lobed, with elongated caudate lobes; petioles and inflorescence glabrous; sepals slightly ciliate, somewhat shorter than the oblong-obovate petals.

China: Hupeh, *E. H. Wilson* (No. 550).

This is a very interesting form, as no other species or variety belonging to this group has leaves tomentose beneath.

It seems doubtful if *Acer lætum* and *Acer pictum* can be considered specifically distinct. The chief distinguishing character is in the length of the wings of the fruit, but this affords no clear separation, as there are intermediate forms. The pubescence of the calyx and the relative length of the petals and sepals are still less reliable. The Himalayan specimens of *Acer lætum* that I have seen have perfectly glabrous sepals, and in at least one case I have found the petals about one third longer than the sepals, while in Japanese specimens of *Acer pictum* the calyx is sometimes villous on the outer surface and the sepals are ciliate and nearly as long as the petals. The bark of two-year-old branches is always smooth and greenish, olive-brown or purplish in *Acer lætum*, while in *Acer pictum* the branches are usually furnished with lenticels, and become in their second year light gray or light grayish brown with slight longitudinal fissures, although in several Japanese specimens I find the bark smooth and very similar in color to that of *Acer lætum*.

4. ACER TENELLUM, Pax, *Hooker Icon.* xix., under t. 1897 (1889); *Engler Pflanzenreich*, Heft 8 (iv. 163), 53, f. 9. — Henry, *Gard. Chron.* ser. 3, xxxiii. 100.

China: Hupeh, *E. H. Wilson* (No. 591); Szechuen, *Henry* (No. 5612).

Cultivated at the Veitchian Nurseries.

5. ACER LONGIPES, *n. sp.*

Acer longipes, Franchet in herb.

Leaves deciduous, three-lobed, from 10 to 14 centimetres long and from 13 to 16 centimetres broad, or sometimes undivided, and then ovate, from 8 to 11 centimetres long and from 4 to 5.5 centimetres broad, subcordate at the base and usually five-nerved, quite entire, the lobes triangular-ovate, caudate and aristate, dark yellowish green and glabrous above, light green and soft-pubescent beneath, at least while young, with tufts of hairs in the axils of the veins; their petioles slender, glabrous, from 6 to 12 centimetres long. Flowers on slender pedicels, in loose corymbs, about 8 centimetres long and from 7 to 12 centimetres broad, compound, glabrous, short-peduncled; sepals elliptic, about 4 millimetres long, obtuse; petals obovate-oblong, of about equal length, the staminate with eight stamens inserted at the margin of the disk, the pistillate with rudimentary stamens; ovary glabrous, glandular; style shorter than the slender revolute stigmas, the very young fruits with wings spreading at about right angles and several times longer than the nutlets.

A tree 4 metres high (according to Wilson); branchlets smooth, olive-green or purple, glabrous while young; winter-buds with about six pairs of scales. Flowers appearing with the leaves.

China: Szechuen, "Tchen-Kiou-tin," *R. P. Farges;* Hupeh, Patung, *E. H. Wilson* (No. 327).

Acer longipes seems most closely related to *Acer lætum*, C. A. Meyer, but differs from that species in the distinctly three-lobed or sometimes undivided leaves pubescent beneath. From *Acer lætum*, var. *tricaudatum*, it is easily distinguished by its much larger leaves, subcordate at the base and pubescent beneath, by the very long petioles, the presence of undivided leaves, and by the much larger and looser corymbs. In both specimens the staminate flowers have dropped, except a few in Wilson's specimen which present a peculiar abnormal condition, the whole flower being slightly enlarged, with the filaments converted into oblong fleshy and nearly terete bodies bearing apparently well-developed anthers at the apex.

II. PALMATA.

6. ACER SIEBOLDIANUM, Miquel, *Ann. Mus. Lugd. Bat.* ii. 87 (1865); *Prol. Fl. Jap.* 19; *Arch. Néerl.* ii. 68. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 447; *Mél. Biol.* x. 606. — Pax, *Engler Bot. Jahrb.* iii. 200; *Engler Pflanzenreich*, Heft 8 (iv. 163), 25.

Acer Japonicum, var. *Sieboldianum*, Franchet & Savatier, *Enum. Pl. Jap.* ii. 317 (1857).

Japan.

ACER SIEBOLDIANUM, β MANDSHURICUM, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxxi. 25 (1886); *Mél. Biol.* xii. 433.

Acer circumlobatum, var. *Pseudo-Sieboldianum*, Pax, *Engler Bot. Jahrb.* vii. 200 (1886); *Engler Pflanzenreich*, Heft 8 (iv. 163), 25.

Eastern Siberia: Manchuria, Port Bruce, *Maximowicz*, 1860; Amurland, Vladivostock, *C. S. Sargent*, August, 1903.

This variety seems most closely related to *Acer Japonicum*, Thunberg, but as I have not seen the flowers I retain it under *Acer Sieboldianum*, where it was placed by Maximowicz. *Acer circumlobatum*, Maximowicz, differs markedly in the ovate outline of its leaves.

7. ACER PALMATUM, Thunberg, *Fl. Jap.* 162 (1784); *Icon. Fl. Jap.* t. 44. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 448, *Mél. Biol.* x. 607. — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 141. — Pax, *Engler Bot. Jahrb.* vii. 201; *Engler Pflanzenreich*, Heft 8 (iv. 163), 25. — Shirasawa, *Icon. Ess. Fl. Jap.* i. 109, t. 68. — Schneider, *Dendr. Winterstud.* 214, 257, f. 219, m–r.

Acer polymorphum, Siebold & Zuccarini, *Abhand. Akad. Münch.* iv. 2, 158 (1845); *Fl. Jap.* ii. t. 145, 146.

Japan.

China: Hupeh, *E. H. Wilson* (Nos. 538, 540).

The two specimens collected by Wilson are both in flower, and the young leaves are slightly villous. No. 540 has somewhat larger and purple flowers and axillary tufts of hairs on the under side of the leaves, while No. 538 has smaller and paler flowers, no axillary tufts of hairs, and the hairs on the leaves are longer and less dense.

8. ACER ROBUSTUM, Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 79 (1902).

China: Shensi, *Giraldi* (No. 2116 ex Pax).

III. SPICATA, PAX.

9. ACER OLIVERIANUM, Pax. See p. 153, t. 77.

10. ACER GIRALDII, Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 79 (1902).

China: Shensi, *Giraldi* (ex Pax).

11. ACER CAMPBELLI [Hooker f. & Thomson ex Brandis, *Forest Fl. Brit. Ind.* 109, nomen nudum (1874)]. — Hiern, *Hooker f. Fl. Brit. Ind.* i. 696 (1875). — Pax, *Engler Bot. Jahrb.* vii. 196; *Engler Pflanzenreich*, Heft 8 (iv. 163), 21.

Sikkim Himalayas.

China: Yun-nan, *Henry* (No. 9179).

ACER CAMPBELLI, var. YUNNANENSE, *n. var.*

Leaves usually seven-lobed, from 6 to 10 centimetres long, from 9 to 14 centimetres broad, truncate or nearly so at the base, the lobes ovate-oblong, caudate, sharply serrate, with acuminate teeth, glabrous on both surfaces. Corymb elongated-thyrsoid, with the peduncle about 8 to 10 centimetres long; petals obovate, truncate and irregularly dentate at the apex, from 2.5 to 3 centimetres long, about as long as the triangular-ovate sepals; disk glabrous; ovary pilose; style about 1 millimetre long, shorter than the revolute stigmas.

Yun-nan, *Henry* (No. 10495).

This variety differs from the type chiefly in its glabrous disk, the pilose not densely villous ovary, and in the sharply and setosely serrate leaves. In the type the disk is densely covered with a short villous tomentum, and the sepals are sparingly villous on the inner surface.

12. ACER CÆSIUM [Wallich ex Brandis, *Forest Fl. Brit. Ind.* 111, t. 21 (1874)]. — Hiern, *Hooker f. Fl. Brit. Ind.* i. 695. — Pax, *Engler Bot. Jahrb.* vii. 196; *Engler Pflanzenreich*, Heft 8 (iv. 163), 14.

China: West Hupeh, *E. H. Wilson* (No. 2707, Herb. Kew).

West Himalayas.

13. ACER SINENSE, Pax. See p. 155, t. 78.

14. ACER WILSONI, Rehder. See p. 157, t. 79.

15. ACER ERIANTHUM, Schwerin. See p. 159, t. 80.

16. ACER FLABELLATUM, Rehder. See p. 161, t. 81.

17. ACER CAUDATUM, Wallich. See p. 163, t. 82.

18. ACER GINNALA, Maximowicz, *Bull. Phys. Math. Acad. Sci. St. Pétersbourg*, xv. 126 (1857); *Mél. Biol.* ii. 415. — Pax, *Engler Bot. Jahrb.* vii. 185; *Engler Pflanzenreich*, Heft 8 (iv. 163), 12. — Schneider, *Dendr. Winterstud.* 227, 257, f. 220, h–k.

Acer Tataricum, var. *laciniatum*, Regel, *Bull. Phys. Math. Acad. Sci. St. Pétersbourg*, xv. 217 (1857); *Mél. Biol.* ii. 483.

Acer Tataricum, var. *Ginnala*, Maximowicz, *Mém. Sav. Étr. Acad. Sci. St. Pétersbourg*, ix. 67 (*Prim. Fl. Amur.*) (1859); *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 446; *Mél. Biol.* x. 604. — Hance, *Jour. Bot.* xx. 4.

Acer Tataricum, var. *Aidzuense*, Franchet, *Bull. Soc. Bot. France*, xxvi. 84 (1879).

Acer Tataricum, var. *acuminatum*, Franchet, *Nouv. Arch. Mus. Paris*, sér. 2, v. 76 (*Pl. David.* ii.) (1884).

Acer Tataricum, Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 142 (not Linnæus) (1886).

Acer Ginnala, var. *Aidzuense*, Schwerin, *Gartenflora*, xlii. 231 (1893).

China: Chihli; Kiangsi (ex Forbes & Hemsley); Kiangsu (ex Hance); Chehkiang, Ningpo, *Faber*; Mongolia (ex Franchet). Eastern Siberia: Manchuria, Suifun, *Goldenstaedt*; Amurland, *Maack*, 1855, *Maximowicz, Korshinsky*, July, 1891, Khaborovka, *C. S. Sargent*, September, 1903.

Japan.

19. ACER BUERGERIANUM, Miquel, *Ann. Mus. Lugd. Bat.* ii. 88 (1865); *Prol. Fl. Jap.* 20.

Acer trifidum, Hooker & Arnott, *Bot. Voy. Beechey*, 174 (not Thunberg) (1841). — Siebold & Zuccarini, *Abhand. Akad. Münch.* iv. 2, 157; *Fl. Jap.* ii. 81, t. 143, excl. f. i. and 1–4. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 445; *Mél. Biol.* x. 603; xii. 75. — Pax, *Engler Bot. Jahrb.* vii. 186; *Engler Pflanzenreich*, Heft 8 (iv. 163), 10. — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 142.

Acer palmatum, α *subtrilobum*, K. Koch, *Ann. Mus. Lugd. Bat.* i. 251 (nomen nudum) (1863–64), ex Miquel, *Ann. Mus. Lugd. Bat.* ii. 88.

Acer trinerve, Dippel, *Handb. Laubholzk.* ii. 428, f. 200 (1892). — Pax, *Engler Bot. Jahrb.* xvi. 393; *Engler Pflanzenreich*, Heft 8 (iv. 163), 10.

Acer trifidum Buergerianum, Schwerin, *Gartenflora*, xlii. 258 (1893).

China: Kiangsu and Kiangsi (ex Forbes & Hemsley), Japan.

ACER BUERGERIANUM, var. NINGPOENSE, *n. comb.*

Acer trifidum, var. *Ningpoense*, Hance, *Jour. Bot.* xi. 168 (1873). — Pax, *Engler Bot. Jahrb.* vii. 187.

Acer Paxii, var. *Ningpoense*, Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 11 (1902).

China: Ningpo, *Faber* (Herb. Kew), *Swinhoe* (ex Hance).

Japan (ex Pax).

20. ACER PAXII, Franchet, *Bull. Soc. Bot. France*, xxxiii. 464 (1887); *Pl. Delavayanæ*, 144, t. 31. — Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 10, f. 3.

China: Yun-nan, *Delavay* (ex Franchet).

IV. INTEGRIFOLIA, PAX.

21. ACER OBLONGUM, Wallich ex De Candolle, *Prodr.* i. 593 (1825). — Cambessedes, *Jacquemont Voyage*, iv. t. 34. — Hiern, *Hooker f. Fl. Brit. Ind.* i. 693. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 442; *Mél. Biol.* x. 599. — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 141. — Pax, *Engler Bot. Jahrb.* vii. 208; *Engler Pflanzenreich*, Heft 8 (iv. 163), 31. — Henry, *Gard. Chron.* ser. 3, xxxiii. 62.

Acer laurifolium, D. Don, *Prodr. Fl. Nepal.* 249 (1825).

Acer Buzimbala, Hamilton, MSS. ex D. Don, *Prodr. Fl. Nepal.* 249 (1825).

Acer oblongum glaucum, Schwerin, *Gartenflora*, xlii. 228 (1893).

China: Hupeh, *Henry* (Nos. 1685, 6392), *E. H. Wilson* (No. 397); Szechuen, *Henry* (No. 7226).

Himalayas.

ACER OBLONGUM, var. LATIALATUM, Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 31 (1902). — Henry, *Gard. Chron.* ser. 3, xxxiii. 62.

China: Hupeh, *Henry* (No. 6392).

ACER OBLONGUM, var. CONCOLOR, Pax, *Hooker Icon.* xix., under t. 1897 (1889). — Henry, *Gard. Chron.* ser. 3, xxxiii. 62.

China: Hupeh and Szechuen (ex Pax).

ACER OBLONGUM, var. TRILOBUM, Henry, *Gard. Chron.* ser. 3, xxxiii. 62 (1903).

China: Hupeh, *Henry* (No. 3199 A).

22. ACER LÆVIGATUM, Wallich, *Pl. As. Rar.* ii. 3, t. 104 (1831). — Hiern, *Hooker f. Fl. Brit. Ind.* i. 693. — Pax, *Engler Bot. Jahrb.* vii. 209; *Engler Pflanzenreich*, Heft 8 (iv. 163), 134. — Henry, *Gard. Chron.* ser. 3, xxxiii. 62.

Acer Fabri, Hance, *Jour. Bot.* xxii. 76 (1884). — Pax, *Engler Bot. Jahrb.* vii. 210. — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 140.

Acer oblongum, var. *lævigatum*, Wesmael, *Bull. Soc. Bot. Belg.* xxix. 42 (1890).

China: Hupeh, *E. H. Wilson* (Nos. 16 [Nanto], 574, 574 A); Szechuen, *Henry* (No. 5538), *Faber* (Nos. 445, 456).

ACER LÆVIGATUM, var. RETICULATUM, *n. var.*

Acer reticulatum, Champion, *Jour. Bot. and Kew Gard. Misc.* iii. 312 (1851). — Seemann, *Bot. Voy. Herald*, 368, t. 80. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 442; *Mél. Biol.* x. 599. — Pax, *Engler Bot. Jahrb.* vii. 209. — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 141.

Leaves generally smaller, abruptly acuminate, very thick, strongly reticulate, with tufts of brown hairs in the axils of the veins beneath, red when unfolding; corymb, from 1.5 to 2 centimetres long, on a slender peduncle of about the same length; sepals red like the whole inflorescence; nutlets strongly convex, reticulate, about 8 millimetres long and broad; wings with the nutlets nearly 3 centimetres long, 12 millimetres broad, pale yellowish brown, bright red when young.

China: Kwangtung, Hongkong, *Wright*, *Wilford*, *Hance*.

23. ACER FARGESI, *n. sp.*

Acer Fargesi, Franchet in herb.

Leaves persistent, coriaceous, elliptic-oblong to lanceolate-oblong or oblanceolate-oblong, from 5 to 9 centimetres long, from 1.5 to 3.8 centimetres broad, abruptly acuminate or caudate, narrowed at the base, penninerved, entire or exceptionally with a few teeth at the apex, dark green above, light green and glabrous beneath with the exception of small axillary tufts of hairs, their petioles from 0.5 to 1 centimetre long, glabrous. Inflorescence a broad and short panicle, glabrous, from 1.5 to 2.5 centimetres long, on a slender peduncle about as long or sometimes longer or shorter than the panicle; sepals 5, elliptic-oblong, 4 millimetres long, slightly hairy on the outer surface, purple like the whole inflorescence; petals somewhat shorter than the sepals, spathulate-obovate, white; stamens eight, shorter than the sepals; anthers mucronate; style slender, 2.5 millimetres long, with short spreading stigmas. Fruit slender, pedicellate, bright red or finally brownish red; nutlets oval, strongly convex and slightly veined, from 6 to 7 millimetres long and from 4 to 5 millimetres broad; wings spreading at an obtuse angle, with the nutlet from 2.5 to 3 centimetres long and from 8 to 10 millimetres broad.

A tree from 7 to 10 metres high; branchlets slender, smooth, greenish; winter-buds with two pairs of outer glabrous scales and two pairs of inner accrescent scales pubescent on the outer surface. Flowers appearing with the leaves.

China: Szechuen, "Tchen-Kéou-tin," *Farges*; Hupeh, *E. H. Wilson* (Nos. 1993, 2265); Yun-nan, *Delavay* (ex Franchet in herb.).

Acer Fargesi is easily distinguished from the closely related *Acer lævigatum*, Wallich, by the smaller caudate not reticulate leaves, and from the type of that species also by the red color of the inflorescence and young foliage, resembling in this respect its variety *reticulatum*, Rehder.

24. ACER LANCEOLATUM, Molliard, *Bull. Soc. Bot. France*, sér. 4, iii. 134, t. 5 (1903).

China: Kwangsi, *Beauvais* (ex Molliard); Kwangtung, Hongkong, *Ford*, *Wright*, 1853–56.

Formosa, *Henry* (No. 1257).

The specimens from Hongkong which were referred to *Acer oblongum*, Wallich, by Bentham and by Hemsley, and to *Acer lævigatum*, Wallich, by Pax, seem to be most closely related to *Acer lanceolatum*, though they differ from it slightly by the somewhat broader leaves, rather shorter petioles, and pubescent inflorescence. From both these species and from *Acer Fargesi*, Rehder, *Acer lanceolatum* differs in the sessile inflorescence, and from *Acer oblongum* in the leaves being not three-nerved at the base and in the elongated inflorescence, and from *Acer lævigatum* and *Acer Fargesi* in the more slender petioles and glaucescent leaves.

25. ACER CORDATUM, Pax, *Hooker Icon.*, xix., under t. 1897 (1889); *Engler Pflanzenreich*, Heft 8 (iv. 163), 33, f. 6. — Henry, *Gard. Chron.* ser. 3, xxxiii. 62.

China: Hupeh, *Henry* (No. 7721 type !), west Hupeh, *E. H. Wilson* (No. 1819).

The leaves of Wilson's specimen are distinctly ovate to ovate-oblong, remotely serrulate almost from the base, and sometimes abruptly constricted below the middle into broad and shallow basal lobes. The flowers, not described by Pax, are in slender-peduncled glabrous corymbs, from 2 to 2.5 centimetres broad; sepals 5, oval or ovate, about 3 millimetres long, purple like the slender pedicels, and villous on the inner surface, especially near the margins; petals five, shorter than the sepals, white, suborbicular, plicate and often toothed at the apex; stamens six to eight, about as long as the sepals; anthers oval; disk extrastaminal; ovary glabrous; style slender, much longer than the short stigmas.

26. ACER DISCOLOR, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 436 (1880), xxvii. 560, t. 27, f. 6; *Mél. Biol.* x. 589; xi. 350, t. f. 6. — Pax, *Engler Bot. Jahrb.* vii. 253; *Engler Pflanzenreich*, Heft 8 (iv. 163), 33. — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 140.

China: Shensi and Kansu (ex Maximowicz); Szechuen (ex Pax).

V. INDIVISA.

27. ACER SIKKIMENSE, Miquel, *Arch. Néerl.* ii. 471 (1867). — Pax, *Engler Bot. Jahrb.* vii. 215; *Engler Pflanzenreich*, Heft 8 (iv. 163), 34.

Acer Sikkimense subintegrum, Schwerin, *Gartenflora*, xlii. 229 (1893). — Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 34.

East Himalayas.

ACER SIKKIMENSE, var. SERRULATUM, Pax, *Engler Bot. Jahrb.* vii. 215 (1886); *Engler Pflanzenreich*, Heft 8 (iv. 163), 34. — Henry, *Gard. Chron.* ser. 3, xxxiii. 63.

China: Yun-nan, *Henry*, No. 10640.

Himalayas.

28. ACER DAVIDI, Franchet. See p. 167, t. 83.

29. ACER LAXIFLORUM, Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 36, f. 7, C D (1902).

China: Szechuen (Mt. Omei), *Faber* (ex Pax); *A. E. Pratt* (No. 838 Herb. Kew).

ACER LAXIFLORUM, var. NINGPOENSE, Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 36.

China: Chehkiang, Ningpo (ex Pax).

VI. MACRANTHA.

30. Acer tegmentosum, Maximowicz, *Bull. Phys. Math. Acad. Sci. St. Pétersbourg*, xv. 125 (1856); *Mém. Sav. Étr. Acad. Sci. St. Pétersbourg*, ix. 66 (*Fl. Amur.*); *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 441; *Mél. Biol.* x. 597. — Nicholson, *Gard. Chron.* n. ser. xv. 74, f. 13. — Pax, *Engler Bot. Jahrb.* vii. 246; *Engler Pflanzenreich*, Heft 8 (iv. 163), 67.

Acer Pennsylvanicum, var. *tegmentosum*, Wesmael, *Bull. Soc. Bot. Belg.* xxix. 62 (1890).

Eastern Siberia: Manchuria, *Maack*, 1855; Amurland, *Maximowicz*, 1860, Ostium Ussuri, *Korshinsky*, 1891, Vladivostock and Khabarovka, *C. S. Sargent*, August, 1903.

31. Acer Grosseri, Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 80 (1902).

China: Shensi, *Giraldi* (No. 2121 ex Pax).

32. Acer urophyllum, Maximoiwcz. See p. 169, t. 84.

VII. ARGUTA, n. sect.[1]

33. Acer tetramerum, Pax. See p. 171, t. 85.

34. Acer betulifolium, Maximowicz, *Act. Hort. Petrop.* xi. 108 (1890). — Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 10.

China: Kansu, *S. N. Potanin* (Herb. Kew).

Acer betulifolium is closely related to *Acer tetramerum*, Maximowicz, but the leaves are always three-nerved and truncate or broadly cuneate at the base, triangular-ovate and slightly lobed, glabrescent or with scattered appressed hairs beneath, and the wings of the fruit are spreading at an obtuse angle. The flowers are unknown. Henry's No. 315, quoted by Maximowicz as belonging to his *Acer betulifolium*, I have referred to *Acer tetramerum*, Pax, to which it certainly belongs if the two species prove distinct.

35. Acer barbinerve, Maximowicz. See p. 173, t. 86.

VIII. LITHOCARPA.

36. Acer Francheti, Pax. See p. 175, t. 87.

37. Acer Schoenermarkiæ, Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 71, f. 13 (1902).

China: Yun-nan, *Henry*, No. 10497.

38. Acer pilosum, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 436 (1880); xxvii. 560, t. 27, f. 1–5; *Mél. Biol.* x. 590, 604; xi. 350, t., f. 1–5. — Pax, *Engler Bot. Jahrb.* vii. 187; *Engler Pflanzenreich*, Heft 8 (iv. 163), 12. — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 141.

China: Kansu, *Piasezki* (ex Maximowicz).

This incompletely known species, of which I have seen no specimen, has, according to the figure published by Maximowicz, the staminate and pistillate inflorescences emanating from different leafless buds, and may therefore be placed in this section instead of in the Spicata, to which it has been referred by Pax.

IX. TRIFOLIATA.

39. Acer Sutchuense, Franchet, *Jour. de Bot.* viii. 294 (1894). — Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 29.

China: Szechuen, *Farges* (ex Franchet); Hupeh, *E. H. Wilson* (No. 639).

40. Acer Mandshuricum, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xii. 228 (1868); xxxi. 26; *Mél. Biol.* vi. 371; xii. 434. — Pax, *Engler Bot. Jahrb.* vii. 253; xi. 80; *Engler Pflanzenreich*, Heft 8 (iv. 163), 29.

Negundo Mandshuricum, Nicholson, *Gard. Chron.* n. ser. xvi. 815 (1881).

Eastern Siberia: Manchuria, Port May, Maximowicz, 1860; mountains east of Harbin, *C. S. Sargent*, August, 1903.

41. Acer triflorum, Komarov, *Act. Hort. Petrop.* xviii. 430 (1901).

Manchuria and northern Korea (ex Komarov).

42. Acer Nikoense, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xii. 227 (1867); *Mél. Biol.* vi. 370. — Pax, *Engler Bot. Jahrb.* vii. 205; *Gartenflora*, xli. 149, f. 29; *Engler Pflanzenreich*, Heft 8 (iv. 163), 29. — Sargent, *Gard. & For.* vi. 154, f. 26. — Shirasawa, *Icon. Ess. For. Jap.* i. 110, t. 68.

Acer Maximowiczianum, Miquel, *Arch. Néerl.* ii. 472, 478 (December, 1867).

Negundo Nikoense, Nicholson, *Gard. Chron.* n. ser. xvi. 815 (1881).

China: Hupeh, *E. H. Wilson* (No. 368).

Japan.

43. Acer griseum, Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 30, t. 5 (1901). — Henry, *Gard. Chron.* ser. 3, xxxiii. 100.

Acer Nikoense, var. *griseum*, Franchet, *Jour. de Bot.* viii. 294 (1894).

China: Szechuen, *Farges* (ex Franchet); Hupeh, *E. H. Wilson* (No. 1883).

Cultivated at the Veitchian Nurseries.

Wilson gives the height of the tree as 15 to 40 feet, and a piece of an older branch shows a reddish brown bark exfoliating in thin flakes. The staminate flowers resemble closely those of *Acer Nikoense*, Maximowicz.

44. Acer Henryi, Pax, *Hooker Icon.* xix. t. 1896 (1889); *Engler Pflanzenreich*, Heft 8 (iv. 163), 30. — Henry, *Gard. Chron.* ser. 3, xxxiii. 100.

China: Hupeh, *Henry* (No. 5644 A), *E. H. Wilson* (No. 548); Szechuen, *Henry* (ex Pax).

Cultivated at the Veitchian Nurseries.

[1] *Acer tetramerum*, Pax, *Acer barbinerve*, Maximowicz, and *Acer argutum*, Maximowicz, which are placed by Pax in his section Lithocarpa, differ so widely from the other species of that group that it seems advisable to separate these species as a distinct group which may be called section Arguta. This section differs from the Lithocarpa chiefly in its winter-buds with only one pair of outer scales, in the leafy pistillate inflorescence, the four stamens, the folding of the embryo, and in the shape and serration of the leaves, thus forming a connecting link between the Lithocarpa and the Macrantha, for to the latter it shows some relationship in its general habit and in the winter-buds. Besides the species already mentioned, the section Arguta will include *Acer betulifolium*, Maximowicz, and two Himalayan species, *Acer stachyophyllum*, Hiern, and *Acer acuminatum*, Wallich. As the last named species has often been confounded with *Acer caudatum*, Wallich, its synonymy may be given here.

Acer acuminatum, Wallich ex D. Don, *Prodr. Fl. Nepal.* 249 (1825).

Acer sterculiaceum, K. Koch, *Dendr.* i. 521 (not Wallich) (1869).

Acer caudatum, Brandis, *Forest Fl. Brit. Ind.* 112 (not Wallich) (1875). — Nicholson, *Gard. Chron.* ser. 2, xv. 364, f. 68. — Hiern, *Hooker f. Fl. Brit. Ind.* i. 695 (in part). — Collett, *Fl. Siml.* 99, f. 32.

EXPLANATION OF THE PLATE.

Plate LXXXVII. Acer Francheti.

1. A flowering branch, of a staminate tree, natural size.
2. A staminate flower, enlarged.
3. A flowering branch of a pistillate tree, natural size.
4. A pistillate flower, enlarged.
5. An ovary, enlarged.
6. A fruiting branch, natural size.
7. Vertical section of a seed, enlarged.
8. An embryo, enlarged.

C. E. Faxon del.

ACER FRANCHETI, Pax

PARTHENOCISSUS QUINQUEFOLIA, PLANCH.

PARTHENOCISSUS QUINQUEFOLIA, Planchon, *De Candolle Monogr. Phaner.* v. 448 (1887). — Small, *Fl. S. E. States*, 758.

HEDERA QUINQUEFOLIA, Linnæus, *Spec.* 202 (1753). — Hill, *Veg. Syst.* 16, t. 7, f. 2. — Marshall, *Arbust. Am.* 59. — Walter, *Fl. Car.* 102. — Aiton, *Hort. Kew.* i. 281.

VITIS HEDERACEA, Ehrhart, *Beitr.* vi. 85 (1791). — Willdenow, *Spec.* i. 1183; *Enum.* 267. — Poiret, *Lamarck Dict.* viii. 610. — Aiton, *Hort. Kew.* ed. 2, ii. 52. — Bigelow, *Fl. Bost.* 93. — Sprengel, *Syst.* i. 778.

VITIS QUINQUEFOLIA, Lamarck, *Ill.* ii. 135 (1793). — Moench, *Meth.* 76. — Miquel, *Ann. Mus. Lugd. Bat.* i. 91.

AMPELOPSIS QUINQUEFOLIA, Michaux, *Fl. Bor. Am.* i. 160 (1803). — Roemer & Schultes, *Syst.* v. 321. — Hooker, *Fl. Bor. Am.* i. 114. — Torrey & Gray, *Fl. N. Am.* i. 245. — Gray, *Man.* 87; *Gen. Ill.* 166, t. 162. — Emerson, *Trees Mass.* ii. 535, t. — Chapman, *Fl.* 72. — Bailey, *Gray Syn. Fl.* i. pt. i. 431.

CISSUS HEDERACEA, Persoon, *Syn.* i. 143 (1805). — Pursh, *Fl. Am. Sept.* i. 170. — Nuttall, *Gen.* i. 144. — Elliott, *Sk.* i. 305. — Torrey, *Fl. N. U. S.* 266.

AMPELOPSIS HEDERACEA, De Candolle, *Prodr.* i. 633 (1824). — Don, *Gen. Syst.* i. 694. — Spach, *Hist. Vég.* iii. 216. — Darlington, *Fl. Cestr.* 153. — Loudon, *Arb. Brit.* i. 482, f. 146.

QUINARIA HEDERACEA, Rafinesque, *Am. Man. Grape Vines*, 6 (1830); *Med. Fl.* ii. 122; *Sylva Tellur.* 87.

AMPELOPSIS QUINQUEFOLIA, var. ANGUSTIFOLIA, Dippel, *Handb. Laubholzk.* ii. 575 (1892).

PARTHENOCISSUS ENGELMANNI, Graebner, *Gartenflora*, xlix. 285 (1900).

AMPELOPSIS QUINQUEFOLIA, var. ENGELMANNI, Rehder, *Bailey Cycl. Am. Hort.* i. 59 (1900).

AMPELOPSIS RADICANTISSIMA ENGELMANNI, Schelle, *Beissner, Schelle & Zabel Handb. Laubholz.* 332 (1903).

Leaves five-foliolate or occasionally three-foliolate, their petioles usually from 6 to 10 centimetres long, or toward the end of the shoots much shorter; leaflets ovate or elliptic to obovate-oblong, generally from 5 to 10 centimetres long, acuminate, narrowed at the base into petiolules from 0.5 to 1 centimetre in length, coarsely and often crenately serrate, with broad abruptly acuminate and mostly somewhat rounded teeth, dull green above, glaucescent beneath, and usually of thickish texture. Flowers greenish on slender pedicels from 2 to 5 millimetres long, in three to six-flowered umbels terminating the ramification of the thyrsoidal or sometimes unequally dichotomous cymes opposite the leaves and usually disposed at the end of the branchlets in large leafy panicles, the internodes of the main axis of the terminal panicle usually from 1 to 2 centimetres long, those of the lateral panicles 1 centimetre or less in length; calyx cupulate, short, indistinctively five-lobed; petals ovate-oblong, about 3 millimetres long, concave, reflexed soon after expanding and caducous; stamens about as long as the petals, exceeding the pistil; disk confluent with the base of the ovary, not distinct, but recognizable by its yellow color and by its secretion; ovary ovoid, attenuated into the short filiform style. Fruits globose, from 5 to 7 millimetres thick, bluish black, covered with a slight glaucous bloom; flesh thin; seeds usually two or three, trigonous-obovoid, from 4 to 4.5 millimetres long, notched at the apex, brown or grayish brown,

slightly reticulate or nearly smooth and somewhat lustrous, with a distinct orbicular or sometimes obovate chalaza on the back.

A high climbing usually glabrous shrub, with rather dark gray bark; young branchlets usually reddish when young; winter-buds pinkish. Tendrils opposite the leaves, with usually five to eight ramifications, developing terminal disks adhering firmly to any support; the older branches clinging also by means of rootlets. Flowers appearing in July and August. Berries ripen in August or September. Leaves turning bright scarlet in the autumn.[1]

New England, south to Florida; Florida specimens, *G. V. Nash* (No. 2471), *A. H. Curtiss* (No. 4748, Herb. Mo. Bot. Gard.), *S. M. Tracy* (No. 7477), *A. S. Hitchcock* (No. 44, Herb. Gray), and Mexico, *C. G. Pringle* (No. 8337, Herb. Gray), west to New York, Ohio, Illinois, and Missouri.

This species differs from *Parthenocissus dumetorum*, Rehder, with which it is often confounded especially in cultivation, chiefly in its disciferous and much-branched tendrils, the thyrsoid cymes usually forming terminal panicles at the end of the branchlets, the shorter and more appressed teeth and the whitish under side of the leaflets, and in the later appearance of the flowers and in the later ripening of the fruits.

Chiefly from cultivated plants the following varieties, which are also found in a wild state, have been distinguished.

PARTHENOCISSUS QUINQUEFOLIA, var. LATIFOLIA, Rehder, *nov. var.*

Ampelopsis latifolia, Tausch, *Flora*, xxi. 738 (1838).
Ampelopsis hylopus, Desmoulins, *Act. Soc. Linn. Bordeaux*, xxiv. 109 (1862).
Ampelopsis hederacea, var. *murorum*, Focke, *Abh. Naturw. Ver. Bremen*, iv. 560 (1875).
Ampelopsis quinquefolia, var. *murorum*, Rehder, *Möller's Deutsch. Gart. Zeit.* x. 440 (1895).
Ampelopsis muralis, Lengerken, *Bot. Zeit.* xliii. 384, t. 4, f. 3–4 (1885).
Quinaria radicantissima, Koehne, *Gartenflora*, xli. 402 (1892); *Deutsch. Dendr.* 399.
Parthenocissus radicantissima, Graebner, *Gartenflora*, xlix. 286 (1900).
Ampelopsis radicantissima, Schelle, *Beissner, Schelle & Zabel Handb. Laubholz.* 332 (1903).

Florida, *E. Palmer*, 1874, *A. H. Curtiss*, 1894 (No. 4748), *G. V. Nash*, 1895 (No. 2471; Herb. Mo. Bot. Gard.), *A. S. Hitchcock*, 1900 (No. 44), *S. M. Tracy*, 1901 (No. 7477, Herb. Gray). Mexico: Hidalgo, *C. G. Pringle*, 1901 (No. 8337, Herb. Gray). Bahama Islands: New Providence, *J. I.*, and *A. R. Northrop* (No. 322), *N. L. Britton & L. J. K. Brace*, September, 1904 (No. 479, Herb. N. Y. Bot. Gard.). Cuba, *C. Wright* (No. 2108, Herb. Gray).

This form differs from the type in its shorter and more numerous, eight to twelve, ramifications of the tendrils, the generally broader leaflets, and in the more elongated inflorescence. The cultivated specimens agree well in the shape of the foliage and in the inflorescence with the broad-leaved form common in southern Florida, the Bahama Islands, and Cuba.

PARTHENOCISSUS QUINQUEFOLIA, var. MINOR, Rehder, *nov. nom.*

Parthenocissus radicantissima, β *minor*, Graebner, *Gartenflora*, lxix. 286 (1900).
Ampelopsis hederacea minor, Hort. ex Graebner, *Gartenflora*, lxix. 286 (1900).
Ampelopsis radicantissima minor, Schelle, *Beissner, Schelle & Zabel Handb. Laubholz.* 332 (1903).
Ampelopsis quinquefolia rotundifolia, Lavallée, *Arb. Segrez.* 34 (nomen nudum), 1877.

This form differs from the last in its generally smaller broadly ovate to oval leaflets, rounded or nearly rounded at the base, on slender petiolules from 0.5 to 1 centimetre in length, and in the tendrils, with usually ten to twelve very short and regular ramifications. Bot. Garden Heidelberg, Germany (Herb. Koehne). Some of the wild specimens enumerated under the preceding variety approach this form very closely.

PARTHENOCISSUS QUINQUEFOLIA, β HIRSUTA, Planchon, *De Candolle Monogr. Phaner.* v. 449 (1887).

Ampelopsis hirsuta, Don, *Cat. Hort. Cantab.* ed. 2, 50 (nomen nudum) (1802). — Roemer & Schultes, *Syst.* v. 321. — De Candolle, *Prodr.* i. 633.
Cissus hederacea, β *hirsuta*, Pursh, *Fl. Am. Sept.* i. 170 (1814).
Quinaria hirsuta, Rafinesque, *Am. Man. Grape Vines*, 6 (1830); *Med. Fl.* ii. 122; *Sylva Tellur.* 89. — Koehne, *Gartenflora*, xli. 403; *Deutsche Dendr.* 399.
Ampelopsis pubescens, Schlechtendal, *Linnæa*, x. 251 (1835).
Ampelopsis quinquefolia, β *hirsuta*, Torrey & Gray, *Fl. N. Am.* i. 245 (1838). — Rehder, *Möller's Deutsche Gart. Zeit.* x. 440.

[1] To *Parthenocissus quinquefolia* should also be referred *Ampelopsis Virginiana*, Hort. ex Dippel, *Handb. Laubholzk.* ii. 575 (1892), *Vitis Engelmanni*, Dieck ex Graebner, *Gartenflora*, xlix. 285 (1900), and *Ampelopsis Engelmanni*, Hort. ex Graebner, *Gartenflora*, xlix. 285 (1900).

***Vitis pubescens*, Miquel, *Ann. Mus. Lugd. Bat.* i. 90 (1863).**
Ampelopsis hederacea, var. *hirsuta*, Jäger, *Ziergeh. Gärt. Park.* 101 (1865).
***Vitis quinquefolia*, c *radicantissima*, Lauche, *Deutsche Dendr.* 470 (1880).**
Ampelopsis quinquefolia cirrhata, Jäger & Beissner, *Ziergeh Gärt. Park.* ed. 3, 28 (1889).
***Vitis quinquefolia*, var. *hirsuta*, Nicholson, *Handb. Kew Arb.* i. 79 (1895).**
Ampelopsis quinquefolia, var. *pubescens*, Bailey, *Gray Syn. Fl.* i. pt. 1, 432 (1897).
***Ampelopsis Graebneri*, Bolle, *Gartenflora*, xlviii. 257, t. 1462 (1899).**
Ampelopsis quinquefolia, var. *Graebneri*, Rehder, *Bailey Cycl. Am. Hort.* i. 59 (1900).
Ampelopsis quinquefolia, var. *radicantissima*, Rehder, *Bailey Cycl. Am. Hort.* i. 59 (1900).
***Parthenocissus Graebneri*, Graebner, *Gartenflora*, xlix. 275 (1900).**
Ampelopsis radicantissima Graebneri, Schelle, *Beissner, Schelle & Zabel Handb. Laubholz.* 332 (1903).
***Parthenocissus hirsuta*, Small, *Fl. S. E. States*, 758 (1903).**

Young branchlets, petioles, leaflets on both sides or at least beneath, and inflorescence more or less pubescent; seeds usually somewhat larger, more glossy, and with a cuneate-obovate chalaza, otherwise like the type.

From Vermont along the western slope of the Appalachian Mountains to Georgia, Missouri, and eastern Mexico. Missouri, *B. F. Bush* (No. 629, Herb. Mo. Bot. Gard.). Mexico: Jalapa, *Schiede* (Herb. Gray, and Mo. Bot. Gard.); Nuevo Leon, *C. G. Pringle* (No. 2505); Guanajuato, *A. Dugès* (Herb. Gray).

Cultivated specimens: Bohemia, *Tausch* in his *Dendroth. Bohem. Exot.* (1830?) (Herb. Mo. Bot. Gard.), Kew Arb., *G. Nicholson*, 1881, Hort. Graebner, *E. Koehne* (Herb. Koehne).

This variety in its most extreme forms, as represented by the Mexican specimens, seems rather distinct in its copious pubescence and larger, more glossy seeds, with a conspicuously cuneate-obovate or spathulate chalaza, but it gradually passes into the typical form especially toward the northern limit of its distribution, which extends perhaps as far north as Canada. The reason that it is so poorly represented in northern collections is probably due to the fact that it flowers and fruits but rarely even in cultivation.

PARTHENOCISSUS QUINQUEFOLIA, var. SAINT-PAULII, Rehder, *nov. nom.*

Parthenocissus Saint-Paulii, Graebner, *Gartenflora*, xlix. 283 (1900).
Ampelopsis radicantissima Saint-Paulii, Schelle, *Beissner, Schelle & Zabel Handb. Laubholz.* 332 (1903).

Young branchlets, petioles, and leaflets beneath and on the midribs above finely pubescent; leaflets elliptic to elliptic-oblong, gradually narrowed into the short petiolules, and sharply serrate, with triangular-ovate acute teeth; tendrils with eight to twelve short and regularly distichously arranged ramifications; corymbs elongated, thyrsoid; seeds somewhat glossy, with an obovate chalaza.

Iowa: Webster City, 1881 (Herb. Gray), Ames, *L. H. Pammel*, 1897 (No. 543, Nat. Herb.). Illinois: St. Clair Co., *H. Eggert*, 1877 (Herb. Gray). Missouri, *Engelmann* (Herb. Mo. Bot. Gard.); Webb City, *E. J. Palmer* (No. 80, Herb. Mo. Bot. Gard.). Texas: Dallas, *J. Reverchon*, 1879 (No. 143).

Cultivated specimens, Hort. St. Paul, Fischbach, Germany, *E. Koehne*, 1899 (Herb. Koehne, type!).

This form is chiefly distinguished from the preceding by the more numerous and shorter ramifications of the tendrils, by the leaflets which are gradually narrowed into short petiolules, and by their sharper and deeper serration resembling that of *Parthenocissus dumetorum*, Rehder. It seems more than any other form of Parthenocissus inclined to attach itself to its support by rootlets, as is shown specially by Engelmann's specimen and by cultivated plants.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate LXXXVIII. Parthenocissus quinquefolia.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. Vertical section of an ovary, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A seed, ventral view, enlarged.
7. A seed, dorsal view, enlarged.
8. A young shoot, natural size.
9. A tendril of the variety Saint-Paulii, natural size.
10. A seed of the variety Saint-Paulii, enlarged.

PARTHENOCISSUS QUINQUEFOLIA, Planch.

PARTHENOCISSUS DUMETORUM, REHD.

PARTHENOCISSUS DUMETORUM, *n. sp.*

CISSUS QUINQUEFOLIA, Sims, *Bot. Mag.* li. t. 2443 (1824).

AMPELOPSIS HEDERACEA, var. DUMETORUM, Focke, *Abh. Naturw. Ver. Bremen*, iv. 559 (1875).

AMPELOPSIS QUINQUEFOLIA, δ LACINIATA, Dippel, *Handb. Laubholzk.* ii. 575 (1892).

QUINARIA QUINQUEFOLIA, Koehne, *Gartenflora*, xli. 402 (1892); *Deutsche Dendr.* 399.

AMPELOPSIS QUINQUEFOLIA, var. VITACEA, Knerr, *Bot. Gaz.* xviii. 70 (1893).

PARTHENOCISSUS VITACEA, Hitchcock, *Key Spring Fl. Manhattan, Kansas*, 26 (1894).

PARTHENOCISSUS QUINQUEFOLIA, Graebner, *Gartenflora*, xlix. 250 (not Planchon) (1900).

PARTHENOCISSUS SPAETHII, Graebner, *Gartenflora*, xlix. 274 (1900).

AMPELOPSIS QUINQUEFOLIA SPAETHII, Schelle, *Beissner, Schelle & Zabel Handb. Laubholz.* 333 (1903).

PARTHENOCISSUS LACINIATA, Small, *Fl. S. E. States*, 759 (1903).

Leaves five-foliolate or occasionally three-foliolate; their petioles from 6 to 15 centimetres long, and toward the end of the shoot much shorter; leaflets oval or ovate to oblong-ovate or rarely oblong, from 5 to 12 centimetres long or occasionally rather longer, acuminate, broadly cuneate or sometimes almost rounded at the base, narrowed into petiolules sometimes 2 centimetres in length, coarsely serrate or incisely serrate, with acuminate triangular-ovate often spreading teeth, bright green and lustrous above, lighter green and usually lustrous beneath, glabrous or sometimes slightly pubescent on the lower side of the midrib. Corymbs glabrous on slender peduncles from 3 to 8 centimetres long, conspicuously dichotomously branched, from 5 to 7 centimetres broad, with usually elongated ramifications; flowers like those of *Parthenocissus quinquefolia*. Fruits in drooping corymbs, from 6 to 8 millimetres thick, dark blue, slightly covered with a glaucous bloom or almost without bloom; seeds usually three or four, trigonous, obovoid, notched at the apex, grayish brown, nearly smooth and somewhat lustrous, with an oval or obovate chalaza on the back.

A glabrous climbing shrub, usually low and scrambling over bushes, but occasionally climbing high into trees; branches with light yellowish gray rather smooth bark, without aerial rootlets; young branchlets green and glabrous, distinctly swollen at the joints; tendrils long and slender, with usually three to five ramifications, twining, without disks.

From eastern Canada, *J. G. Jack*, 1902, west to Manitoba, Wyoming, Montana, *Aven Nelson*, 1894 (No. 544), 1896 (No. 2760, Herb. Mo. Bot. Gard.); Utah, *Alice Eastwood* (No. 18, Herb. Gray), New Mexico, *Fendler*, 1847 (Nos. 108, 120, 121), and *Rothrock* (No. 110, Herb. Gray), and Arizona, south to northern New England, Michigan, Iowa, Kansas, and Texas (Mex. Bound. Surv. No. 165, Nat. Herb.).

This species, which was not separated from *Parthenocissus quinquefolia*, Planchon, until recently, differs from that species chiefly in the less branched tendrils without disks, in the distinctly cymose corymbs, the green under surface of the leaflets, and in their deeper and sharper serration, with often spreading teeth. The type of the species, judging by the plant now cultivated in Germany as *Parthenocissus quinquefolia* and by Focke's description where nothing is said about the difference in the serration, is represented by the plant of eastern Canada, which does not show the deep often incised serration of Planchon's *Parthenocissus quinquefolia*, ε *laciniata*, from Colorado, while Knerr's *Ampelopsis quinquefolia*, var. *vitacea*, is about intermediate between these two forms. As the sharply incised serration represents a

rather striking character and coincides with a distinct geographical range, Planchon's variety may be retained as a separate form of *Parthenocissus dumetorum* as

PARTHENOCISSUS DUMETORUM, var. LACINIATA, Rehder, *nov. nom.*

Parthenocissus quinquefolia, δ *laciniata*, Planchon, *De Candolle Monogr. Phaner.* v. 449 (1887). — Britton & Brown, *Ill. Fl.* ii. 413. — Graebner, *Gartenflora*, xlix. 251.

? *Vitis quinquefolia*, var. *incisa*, Nicholson, *Handb. Kew. Arb.* i. 79 (nomen nudum) (1895).

Parthenocissus quinquefolia, B *heptaphylla*, Graebner, *Gartenflora*, xlix. 251 (not Planchon) (1900).

Ampelopsis quinquefolia dissecta, Hort. ex Graebner, *Gartenflora*, xlix. 251 (1900).

Parthenocissus quinquefolia serrata, Graebner, *Gartenflora*, xlix. 251 (1900).

Ampelopsis quinquefolia serrata, Schelle, *Beissner, Schelle & Zabel Handb. Laubholz.* 333 (1903).

Ampelopsis quinquefolia angustifolia, Schelle, *Beissner, Schelle & Zabel Handb. Laubholz.* 332 (not Dippel) (1903).

This form differs from the type in its generally narrower deeply and often incisely serrate leaflets, with spreading teeth, and in their yellowish green color. All or almost all the specimens from Wyoming, Colorado, Utah, Arizona, New Mexico, and Texas belong here. This form thus occupies the extreme western border of the whole range of the species, while the form of the eastern border represents the type. Some of the horticultural names referred above to this form as synonyms are considered by Graebner distinct varieties, but they hardly represent well-marked forms.

A form with very large leaves, though apparently only a slight cultural deviation, may be mentioned here, as it is a well-known garden plant. This is

PARTHENOCISSUS QUINQUEFOLIA, var. MACROPHYLLA, Rehder, *nov. nom.*

Ampelopsis quinquefolia, var. *macrophylla*, Lavallée, *Arb. Segrez.* 34 (nomen nudum) (1877). — Lauche, *Deutsche Dendr.* 470 (1880).

Ampelopsis quinquefolia, b *latifolia*, Dippel, *Handb. Laubholzk.* ii. 574 (not *Ampelopsis latifolia*, Tausch) (1892).

Vitis quinquefolia, var. *major*, Nicholson, *Handb. Kew. Arb.* i. 79 (nomen nudum) (1895).

Parthenocissus quinquefolia, C *latifolia*, Graebner, *Gartenflora*, xlix. 251 (1900).

Ampelopsis Roylei, Hort., *A. Himalayana*, Hort., *A. major*, Hort., and *A. macrophylla*, Hort. ex Dippel, *Handb. Laubholzk.* ii. 574 (1892).

This form differs in its oval to obovate or elliptic leaflets sometimes 20 centimetres in length, and to 10 or exceptionally to 15 centimetres in width, otherwise like the type.

Parthenocissus hirsutus, Graebner (not Small), according to his description, is apparently a pubescent or hirsute form of *Parthenocissus dumetorum*, but as I have found no form either wild or cultivated like it among the numerous specimens before me, and as even the specimens in Koehne's Herbarium referred partly by Graebner himself to his *Parthenocissus hirsutus* do not agree with his description, the true position of this plant is still doubtful to me. It seems, however, probable, judging from the specimens in Koehne's Herbarium, which are all only slightly pubescent or nearly glabrous, that it is based on hybrids between *Parthenocissus quinquefolia hirsuta* and *Parthenocissus dumetorum*, as such hybrids doubtless occur in gardens as well as hybrids between *Parthenocissus quinquefolia* and *Parthenocissus dumetorum*. The latter hybrid makes it sometimes difficult to separate satisfactorily the cultivated plants of these two species.

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EXPLANATION OF THE PLATE.

PLATE LXXXIX. PARTHENOCISSUS DUMETORUM.

1. A flowering branch, natural size.
2. A fruiting branch, natural size.
3. Cross section of a fruit, enlarged.
4. A seed, dorsal view, enlarged.
5. A seed, ventral view, enlarged.

C. E. Faxon del.

PARTHENOCISSUS DUMETORUM, Rehd.

PARTHENOCISSUS TEXANA, REHD.

PARTHENOCISSUS TEXANA, *nov. comb.*

AMPELOPSIS HEPTAPHYLLA, Buckley, *Proc. Phil. Acad.* 1861, 450 (not Roemer & Schultes) (1861); 1870, 136.

VITIS HEDERACEA, var. TEXANA, Durand, *Bull. Soc. Nat. Acclim.* ix. 486 (1862).[1] — Desmoulins, *Act. Soc. Linn. Bordeaux*, xxiv. 173; *Quatre Mémoires*, 61.

VITIS HEPTAPHYLLA, Britton, *Trans. N. Y. Acad. Sci.* ix. 10 (not Linnæus) (1889).

AMPELOPSIS QUINQUEFOLIA, var. HEPTAPHYLLA, Bailey, *Gray Syn. Fl.* i. pt. i. 432 (1897).

PARTHENOCISSUS HEPTAPHYLLA, Small, *Fl. S. E. States*, 759 (1903).

Leaves seven-foliolate, sometimes six-foliolate, or near the inflorescence five-foliolate; their petioles from 3 to 6 centimetres long or sometimes even shorter; leaflets obovate-oblong to oblanceolate, from 3 to 6 centimetres long, acute, gradually narrowed toward the base into short petiolules or nearly sessile, coarsely toothed above the middle, with usually but two to four teeth on each side, yellowish green above, paler beneath, glabrous or sometimes slightly pubescent on both sides of the midribs. Corymbs rather dense, dichotomously branched, about 3 to 4 centimetres broad or occasionally larger, on slender peduncles 2 to 6 centimetres in length; flowers like those of *Parthenocissus quinquefolia*. Fruits dark blue or nearly black, about 6 millimetres in diameter; seeds three or four, trigonous-obovoid, about 4 millimetres long, grayish brown, slightly lustrous, and somewhat rugulose, with an obovate or oval chalaza gradually narrowed into the raphe.

A glabrous shrub, sometimes climbing to the height of 10 metres; branches without aerial rootlets, with light brown rather smooth bark; young branchlets glabrous, green; tendrils long and slender, with two to four ramifications, twining, without disks.

Western to central Texas, Tom Green Co. to San Saba, Austin, and Hays Co., *F. Lindheimer*, 1851 (No. 550), and *C. Wright* (Herb. Gray), *Frank Tweedy*, May, 1880 (Nat. Herb.), *S. B. Buckley*, 1881, *J. Reverchon*, May and June, 1885, *Munson & Hopkins*, July, 1889, *W. L. Bray*, 1899 (No. 256, Nat. Herb.).

This species is most nearly related to *Parthenocissus dumetorum*, Rehder, and differs from it chiefly in its usually seven-foliolate leaves, with leaflets serrate only above the middle. Though these characters, as most authors have considered, are of comparatively slight value, no intermediate forms have been found.[2]

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[1] Durand quotes "Buckley" (var. nova ined.) as authority for the name.

[2] Until quite recently nearly all botanists have considered these three species as one, or have recognized as varieties some of the more distinct forms, though as early as 1802 Don separated the pubescent form as *Ampelopsis hirsuta* from the type, and in 1830 Tausch distinguished a broad-leaved form as *Ampelopsis latifolia*. The most important distinction, however, the difference in the tendrils, escaped notice until in 1862 Desmoulins (*Act. Soc. Linn. Bordeaux*, xxiv. 104) drew attention to the fact that there are two kinds of tendrils, one with disks by which the plant attaches itself firmly to walls, and one without disks. Again in 1875 Focke (*Abh. Naturwiss. Ver. Bremen*, iv. 558) published a note on this peculiarity and distinguished the two forms by varietal names. Koehne in 1892 (*Gartenflora*, xli. 402) recognized these two forms and also the pubescent form as species, and clearly pointed out the differences between the three, but, unfortunately, he took the species without disks for the type of Linnæus's *Hedera quinquefolia*. In this error he was followed by Graebner in 1900, who in his paper on Parthenocissus (*Gartenflora*, lix. 215, 248, 274, and 283) described seven American species, including a subspecies, all based on cultivated plants. There can, however, be no doubt that the species with disk-bearing tendrils is the typical *Hedera quinquefolia* of Linnæus, as his synonym and the fact that it was then the only form known and cultivated in Europe show. Linnæus quotes in the first place Cornut's *Edera quinquefolia Canadensis*, and the other quotations are likewise based mainly on Cornut, who in 1635 gives a good figure showing distinctly the disk-bearing tendrils and describes them especially as "claviculi, qui in plures fibras crispas

sparguntur, quarum extremitates limosiore callo teguntur: his velut manibus proxima quæque comprehendit" (*Can. Pl. Hist.* 99, f [1635]). The fact that the older botanists, like Miller, Willdenow, and Ehrhart, who drew their descriptions from living plants, mention the disks shows conclusively that the plant in cultivation in their time must have been the disk-bearing species. Miller in 1731 says, "they send forth roots at the joints whereby they fasten themselves to the buildings" (*Gard. Dict.* ed. 1, as *Vitis quinquefolia Canadensis scandens*), and Ehrhart in 1791 (*Beitr.* vi. 85) and Willdenow in 1796 (*Berl. Baumz.* 410) describe the tendrils as "cirrhi apicibus dilatatis adsurguntibus." Duroi in 1771 also mentions that the plant fastens itself to the walls (*Harbk. Baumz.* i. 303), and Moench in 1794 describes it as with leaves "subtus albidis" (*Meth.* 76), which is the case in typical *Parthenocissus quinquefolia*, but not in *Parthenocissus dumetorum*.

I have found in the literature of the subject no earlier mention of a form bearing tendrils without disks than Desmoulin's paper of 1862. The oldest herbarium specimens I have seen, one from a plant cultivated in 1799 in the Botanic Garden at Göttingen and one collected about 1830 by Tausch in Bohemia, belong to the typical *Parthenocissus quinquefolia*, while the oldest European specimen of *Parthenocissus dumetorum* seen was collected in 1862. It seems peculiar that in Europe at present, at least on the continent, *Parthenocissus dumetorum* is more common in cultivation than *Parthenocissus quinquefolia*, and the only explanation I can offer for this is in the fact that *Parthenocissus dumetorum* ripens its fruit earlier and more profusely, and that for this reason and because its foliage is handsomer, larger, and of a more glossy green, it became rapidly distributed soon after its introduction, which probably took place during the first half of the last century, while *Parthenocissus quinquefolia* had been introduced as early as 1629 into English gardens.

Parthenocissus quinquefolia is the only American species of Vitaceæ with disciferous tendrils, which are always developed when the tips of the tendril come in contact with the surface of some firm substance, and which attach themselves firmly to quite smooth objects. After attachment the tendrils contract spirally and thus draw the whole branch closer to its support. Tendrils which have not become attached cease soon to grow, curl up in an irregular way, and finally wither and fall off. An exhaustive study of the formation of the disks was published in 1885 by A. von Langerken (*Bot. Zeit.* lxii. 337, 353, 383, 401, t.), and the subject has also been treated more or less fully by earlier authors, by Mohl in 1827 (*Ueber den Bau und das Winden der Ranken und Schlingpflanzen*, 152, t. 13), by Desmoulins in 1862 (*Note sur une proprieté singulière de la vigne-vierges, Act. Soc. Linn. Bordeaux*, xxiv. 104; *Quatre Mémoires*, 1), by Darwin in 1867 (*On the Movements and Habits of Climbing Plants, Jour. Linn. Soc.* ix. 84, f. 11), by Focke in 1875 (*Abh. Naturw. Ver. Bremen*, iv. 558), and by E. Coicou in 1862 (*Recherches sur la vrille des Ampelidées* [Thèse], Paris), where further information on this subject may be found.

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EXPLANATION OF THE PLATE.

PLATE XC. PARTHENOCISSUS TEXANA.

1. A flowering branch, natural size.
2. A fruiting branch, natural size.
3. Cross section of a fruit, enlarged.
4. A seed, dorsal view, enlarged.
5. A seed, ventral view, enlarged.

C. E. Faxon del.

PARTHENOCISSUS TEXANA, Rehd.

C. E. Faxon del.

MALUS ZUMI, Rehd.

MALUS ZUMI, REHD.

MALUS ZUMI, *nov. nom.*

PYRUS ZUMI, Matsumura, *Tokio Bot. Mag.* xiii. 1 (1899); *Not. Pl. As. Or.* Fasc. iii. 1.

Leaves deciduous, long-petiolate, oblong to ovate-oblong or elliptic-oblong, from 4 to 8 centimetres long, acute at the apex, rounded or narrowed at the base, entire or more or less crenate-serrate, with 6 to 10 pairs of veins, yellowish green above, light green beneath, covered when they unfold with a slight caducous pubescence, soon becoming glabrous, conduplicate in the bud, on the ends of vigorous shoots sometimes slightly lobed; their petioles from 1 to 3 centimetres in length, finely pubescent while young, becoming glabrous; stipules subulate, caducous, or at the end of vigorous branches lanceolate, usually coarsely dentate, and sometimes persistent. Flowers from 2.5 to 3 centimetres in diameter, on pedicels from 2.5 to 3 centimetres long, loosely villous like the calyx-tube or sometimes glabrous, in four to six-flowered umbels; sepals lanceolate, from 5 to 6 millimetres long, villous on the inner and less densely villous on the outer surface; petals elliptic, about 1.5 centimetres long and 1 centimetre broad, obtuse, rounded at the base, shortly unguiculate, glabrous, at first pale pink on the outer surface, becoming pure white; stamens about twenty-five, half as long as the petals; anthers oval; styles four or five, about as long as the stamens, glabrous above, densely villous and connate below for one third of their length; ovary four or five-celled. Pomes red, globose, about 1 centimetre in diameter, marked at the top by the conspicuous scar of the deciduous calyx, spreading or nodding on slender glabrous pedicels from 3 to 3.5 centimetres in length; seeds oblong-ovoid, 3.5 millimetres long, and light yellowish brown.

A medium-sized tree, with erect branches forming a pyramidal head and brown bark; branches reddish brown, lustrous, marked by scattered pale lenticels; young branchlets slightly pubescent while young, becoming reddish brown at the end of their first year; winter-buds small, ovate, acute, with light brown ciliate scales. Flowers appearing in May with the leaves. Fruit ripening in October.

Japan: Nikko Mountains, 1879, and May, 1889 (Herb. Arnold Arboretum ex Herb. Univ. Tokio); Hakone Mountains, Miyanoshita, *C. S. Sargent*, August 25, 1892.

Malus Zumi is closely related to *Malus Sargenti*, Rehder, and to *Malus Toringo*, Siebold, differing from both in the oblong leaves not at all or only slightly lobed, and in the slender petioles, and from the former also in the longer petals rounded at the base, the glabrous leaves, the longer petioles, and the erect branches; from *Malus Toringo* it is further distinguished by the difference in the foliage, by the larger flowers, the larger fruits of bright red color, and by the broader petals rounded at the base.

Malus Zumi was introduced into the Arnold Arboretum by Professor Sargent in 1892. The plants raised from seeds which he collected near Fukushima, in Hondo, have now grown into trees of pyramidal habit about 4 metres high, and have proved perfectly hardy. In May they are covered with a mass of white or slightly pinkish flowers, followed in autumn by attractive bright red fruits. As an ornamental tree *Malus Zumi* is certainly superior to *Malus Toringo*, as both the flowers and fruits are more conspicuous and beautiful. The cultivated plants differ somewhat from the type by the usually more sharply serrate leaves, the glabrescent pedicels and calyx-tube, and by the smaller and pinker flowers of some individuals.

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EXPLANATION OF THE PLATE.

Plate XCI. Malus Zumi.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A petal, enlarged.
4. A stamen, enlarged.
5. Cross section of an ovary, enlarged.
6. A fruiting branch, natural size.
7. Vertical section of a fruit, enlarged.
8. Cross section of a fruit, enlarged.
9. A seed, enlarged.

OROXYLUM FLAVUM, REHD.

OROXYLUM FLAVUM, *n. sp.*

Leaves persistent, opposite, bipinnate, with the peduncle from 50 to 80 centimetres long, usually with three or four pairs of pinnæ, the lowest pair with the basal pinnulæ ternate; leaflets oblong to oblong-lanceolate, from 8 to 18 centimetres long and from 3.5 to 7 centimetres broad, acuminate, narrowed or rarely rounded at the base, entire, dark yellowish green above, bright green beneath, coriaceous, glabrous; petiolules of lateral leaflets from 0.5 to 1.5 centimetres long, of the terminal leaflet from 4 to 6 centimetres long; their petioles about 20 centimetres in length, slightly compressed, like the rachis glabrous and covered with small white dots. Flowers on pedicels from 1 to 1.5 centimetres long, with subulate bracts, in terminal panicles from 20 to 30 centimetres long, on glabrous pithy, not hollow, peduncles from 10 to 15 centimetres in length, the lower branches of the panicle five-flowered, the middle one three-flowered; calyx campanulate, from 3 to 4 centimetres long, with five short acutish teeth, irregularly splitting; corolla campanulate, clear sulphur yellow, five-lobed, the tube 5 centimetres long, 2.5 centimetres wide at the mouth, with semiorbicular reflexed nearly entire subequal lobes imbricate in the bud, about 4 centimetres broad and rather less high; stamens five, inclosed in the mouth of the tube, the posterior stamen slightly shorter and inserted above its base; filaments hairy at the base, with long shaggy hairs; anthers about 8 millimetres long, the cells diverging below; style exceeding the tube of the corolla, with a large two-lobed stigma; ovary cylindrical, compressed, with a fleshy obtusely five-angled disk at the base, two-celled, with several rows of ovules on the central placenta. Fruit unknown.

A tree with light grayish brown slightly longitudinally fissured bark; branchlets with light rough bark, and ample pith. Flowers appearing in spring, exhaling a rather disagreeable odor.

Yun-nan, *Henry*, 1889 (seeds only).

Oroxylum flavum differs from *Oroxylum Indicum*, Ventenat, hitherto the only known species, chiefly in the clear sulphur yellow color of the nearly symmetrical flowers, the plain not toothed or crisped margin of the lobes of the corolla, the splitting calyx, and the oblong leaflets. It was raised from seed sent by Dr. Henry to the Arnold Arboretum, and flowered for the first time in the greenhouse two years ago, the tree being then about 3 metres high, with a single stem. This species will probably be suited to the climate of the southern states and of southern California, and will be a desirable ornamental tree on account of its large pinnate foliage and handsome yellow flowers.

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Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE XCII. OROXYLUM FLAVUM.

1. An inflorescence, natural size.
2. Vertical section of a flower, natural size.
3. A lobe of the corolla, natural size.
4. Vertical section of an ovary, enlarged.
5. Cross section of an ovary, enlarged.
6. A leaf, reduced.

C. E. Faxon del.

OROXYLUM FLAVUM, Rehd.

PHELLODENDRON, Rupr.

Phellodendron (Rutaceæ), Ruprecht, *Bull. Phys. Math. Acad. Sci. St. Pétersbourg*, xv. 353 (1853); *Mél. Biol.* ii. 526. — Maximowicz, *Mém. Sav. Étr. Acad. Sci. St. Pétersbourg*, ix. 72 (*Prim. Fl. Amur.*). — Bentham & Hooker, *Gen.* i. 301. — Baillon, *Hist. Pl.* iv. 480. — Gray, *Proc. Am. Acad.* xxiii. 223. — Engler & Prantl, *Pflanzenfam.* iii. pt. iv. 175.

Pungent aromatic trees, with thick often corky bark, stout terete branchlets with thick pith and bright greenish yellow inner bark, without terminal buds, the end of the branchlet deciduous in summer and leaving a small oblong depressed scar between the two upper axillary buds, pale orange-brown to red-brown and lustrous in their first winter, becoming dull in their third season, and marked for several years by large oblong elevated pale lenticels, and by prominent pale U-shaped leaf-scars regularly decreasing in size from the apex to the base of the branchlet, nearly encircling the buds and marked by the ends of three equidistant groups of large fibro-vascular bundles, the basal group of three, the lateral usually of two bundles. Winter-buds regularly decreasing in size from the apex to the base of the branchlet, rounded and obtuse, with two horizontal ridges, inclosed by two opposite slightly imbricated green scales covered with rufous or silvery lustrous silky pubescence, accrescent with the branchlet and becoming reflexed above the middle. Leaves deciduous, opposite, unequally or occasionally equally pinnate, five to fifteen, usually nine or eleven-foliolate, long-petiolate, the leaflets opposite or alternate, generally acuminate-caudate, finely crenately serrate, petiolulate, revolute in the bud, glandular-dotted,[1] the lateral unsymmetrical at the base, the inner and lowest leaf reduced to an ovate entire leaflet narrowed to below into a short broad petiole, those of seedling plants mostly trifoliolate. Flowers diœcious on short stout pedicels from the axils of small acuminate usually suppressed bracts, in long-stalked axillary sparsely flowered erect panicles with long slender branches, the pedicel of the terminal flower of the staminate inflorescence sometimes furnished near the apex with a minute bractlet, the pistillate inflorescence usually more slender and with fewer flowers than the staminate; calyx five-lobed, open in the bud, the nearly triangular lobes slightly erose or denticulate, persistent under the fruit until the autumn;[2] petals five, three, or four times longer than the calyx-lobes, boat-shaped, acute and incurved at the apex, yellow-green, faintly ridged on the back, villous below the middle on the inner surface, with long scattered pale hairs, slightly imbricated and forming an oblong bud rounded at the apex, remaining nearly erect in anthesis, caducous; disk 0; staminate flower, stamens five, alternate with the petals, hypogynous; filaments yellow, villous near the base, short and stout when the petals first open, in anthesis protruding between them, elongating and becoming slender and twice as long as the petals; anthers sagittate, yellow, attached below the middle, introrse, two-celled, the cells spreading below, opening longitudinally, their connective produced beyond them into a minute point; gynophore oblong, thick, bearing five rudimentary acute densely villous erect free pistils; pistillate flower, stamens reduced to five minute oblong staminodia inserted under the ovary, sometimes bearing rudimentary anthers, accrescent after anthesis and pendent between the base of the petals; pistil of five carpels; ovary

[1] The minute dark glandular dots are most conspicuous and abundant on the leaves of young seedlings, and on those of older plants are only visible under the microscope.

[2] Maximowicz describes the terminal flowers in the staminate inflorescence of *Phellodendron Amurense* with three narrow supplementary calyx-lobes, but we have been unable to find them in the flowers of any of the species, the calyx in all the specimens we have seen appearing to be regularly five-lobed.

five-celled, sessile, obovate, green, glandular, gradually narrowed from above the middle to the base and rather abruptly contracted above into a short thick style crowned with a broad deeply five-lobed yellow stigma; ovules one in each cell, attached from its inner angle near the apex, pendulous, anatropous; raphe ventral; micropyle superior. Fruit in erect stout-branched panicles, drupaceous, subglobose, ripening in the autumn and irregularly deciduous during the winter, with thick tough lustrous black skin, thick, very juicy black aromatic flesh adherent to the nutlets; nutlets five, suspended from below the apex of a woody columella persistent on the branches of the panicle after the fall of the fruit, compressed, straight on the ventral and rounded on the dorsal edge, rounded below, narrowed and abruptly acuminate at the apex; endocarp papery, very translucent, pale green, splitting at maturity to the base into two valves; seed filling the cavity of the nutlet, attached by an elongated narrow hilum extending along the ventral edge from below the apex to below the middle; seed-coat of two layers, the outer crustaceous, nearly black and pitted on the outer surface, the inner pale and membranaceous; embryo erect in thin fleshy albumen; cotyledons flat, oblong, much longer than the short terete superior radicle.[1]

A genus of three species; Amurland to northern and western China, and Japan.

C. S. S.

[1] In the structure of the flowers and of the fruit there appear to be no characters by which the species of Phellodendron can be readily distinguished, but in the foliage and bark, in the color of the branchlets, in the time of flowering, and in habit, the three are quite distinct as they appear in the Arnold Arboretum, where they have been growing for many years. They may be grouped as follows: —

Branchlets light orange-brown; bark of the trunk pale grayish brown, thick, deeply and irregularly divided into rounded ridges, corky, compressible; winter-buds silvery pubescent; leaflets very lustrous on the upper surface, ciliate on the margins; inflorescence slightly pubescent. 1. P. Amurense.

Branchlets bright red-brown; bark thinner, not ridged nor corky (at least on cultivated trees 20 to 30 years old), dark red-brown; winter-buds rufous-pubescent; leaflets not lustrous on the upper surface.

Leaflets sparingly villose on both sides of the midribs, often becoming quite glabrous, naked on the margins, pale or glaucous below; inflorescence glabrous. 2. P. Sachalinense.

Leaflets hoary-tomentose below, pubescent on the midribs above, ciliate on the margins while young; inflorescence hoary-tomentose. 3. P. Japonicum.

PHELLODENDRON AMURENSE, Rupr.

Phellodendron Amurense, Ruprecht, *Bull. Phys. Math. Acad. Sci. St. Pétersbourg*, xv. 353 (1853); *Mél. Biol.* ii. 526. — Maximowicz, *Mém. Sav. Étr. Acad. Sci. St. Pétersbourg*, ix. 72, t. 4 (*Prim. Fl. Amur.*). — Regel, *Mém. Acad. Sci. St. Pétersbourg*, sér. 4, 40 (*Tent. Fl. Ussur.*). — Fr. Schmidt, *Mém. Acad. Sci. St. Pétersbourg*, sér. 7, xii. 37 (*Reisen im Amur-Lande*). — Franchet, *Nouv. Arch. Mus.* sér. 2, v. 67 (*Pl. David.* i.). — Forbes & Hemsley, *Jour. Linn. Soc.* xxiii. 108. — Dippel, *Handb. Laubholzk.* ii. 351, f. 162. — Korshinsky, *Act. Hort. Petrop.* xii. 320 (*Pl. Amur.*). — Koehne, *Deutsche Dendr.* 348, f. 48. — Komarov, *Act. Hort. Petrop.* xxii. 668 (*Fl. Manchur.*).

Leaves from 20 to 30 centimetres long, with slender petioles at first scurfy, soon glabrous, or rarely pubescent; leaflets five to eleven, lanceolate to oblong-ovate, often falcate, gradually or abruptly narrowed at the long-pointed apex, rounded or cuneate at the unequal base, when they unfold light yellow-green and puberulous below toward the base and on the upper side of the midribs, and at maturity dark green and very lustrous on the upper, paler on the lower surface, and glabrous or occasionally with a few scattered hairs near the base of the lower side of the midribs, ciliate on the margins, with long white hairs mostly persistent through the season, from 6 to 10 centimetres long and from 2 to 3.5 centimetres wide, turning clear bright yellow in the autumn before falling; the petiolule of the terminal leaflet from 1.5 to 2 centimetres long, those of the lateral leaflets from 2 to 5 millimetres in length. Inflorescence at first pubescent or puberulous, becoming glabrous, that of the staminate plant with the peduncle from 7 to 9 centimetres long, and from 3 to 4 centimetres broad, that of the pistillate plant with the peduncle from 7 to 8 centimetres long, and from 3 to 5 centimetres broad. Flowers about 5 centimetres in length. Fruit from 10 to 12 millimetres in diameter, in panicles with their stout peduncles from 8 to 10 centimetres long and from 4 to 6 centimetres broad; seeds about 5 millimetres long and 3 millimetres wide.

A tree, usually from 10 to 12 metres high, with a trunk rarely 50 centimetres in diameter and numerous stout erect or slightly spreading branches covered, like the trunk, with 2 layers of bark, the inner thin, very compact, and dark olive-green to brown, the outer thick, corky, light gray-brown, divided nearly throughout by deep furrows into broad rounded ridges branching very irregularly and roughened by small thick plate-like firmly attached scales; branchlets light orange-brown and lustrous during their first winter, becoming dull and light brown slightly tinged with red in their second year, much darker the following season, their thin bark then beginning to separate by longitudinal fissures; winter-buds covered by silvery lustrous hairs more or less reddish at the base, their scales becoming oblong, gradually narrowed to the pointed apex and from 9 to 12 centimetres in length; wood hard, pale brown, lustrous, with thin sapwood and broad bands of large open ducts marking the layers of annual growth.[1] Flowers open in the Arnold Arboretum from the 10th to the middle of June.

Rich woodlands, often near the borders of streams; common. Amurland, *R. Maack* (No. 185), *Radde*, 1858, *V. Komarov*, 1895, and *Korshinsky* (Herb. Arnold Arboretum), *C. S.*

[1] In a specimen of the pistillate tree in bud collected by R. Maack, "ad ripas fluvii Amur" (No. 185, Herb. Arnold Arboretum), there are also hairs along the upper side of the midribs of the leaflets, and the rachis and petiole are densely villose.

Sargent, Khabarovka, August, 1903. Manchuria, *L. Schrenk*, 1885 (Herb. Gray). Mongolia, "environs de Géhol," David ex Franchet.[1]

Small plants of *Phellodendron Amurense* were sent to the Arnold Arboretum from the Imperial Botanic Garden in St. Petersburg in 1873, and staminate plants of this species have flowered here for a number of years.[2]

C. S. S.

[1] Diels (*Engler Bot. Jahrb.* xxix. 424 [*Flora von Central-China*]) refers to this species specimens collected by Giraldi in Shensi, and by Rosthorn in Kuichan. I have not seen them; and the only specimen of Phellodendron from central or western China that I have seen is Henry's (No. 4003, Herb. Gray), which is *Phellodendron Japonicum*.

[2] One of the original trees cut in the Arnold Arboretum when it was twelve years old had a trunk 20 centimetres in diameter, with one layer of sapwood 8 centimetres wide, and bark from 8 to 12 millimetres thick.

EXPLANATION OF THE PLATE.

PLATE XCIII. PHELLODENDRON AMURENSE.

1. An inflorescence of the staminate tree, natural size.
2. A staminate flower before the elongation of the stamens, enlarged.
3. A staminate flower after the elongation of the stamens, enlarged.
4. Vertical section of a staminate flower, enlarged.
5. A petal, interior view, enlarged.
6. A calyx-lobe, enlarged.
7. A stamen, front and rear views, enlarged.
8. An inflorescence of the pistillate tree, natural size.
9. A pistillate flower, enlarged.
10. A pistillate flower with the calyx and petals removed, enlarged.
11. A cluster of fruit and a leaf, natural size.
12. Vertical section of a fruit, enlarged.
13. Cross section of a fruit, enlarged.
14. A nutlet, with the endocarp partly open, enlarged.
15. A seed, enlarged.
16. An embryo, enlarged.
17. End of a winter branchlet, natural size.

C. E. Faxon del.

PHELLODENDRON AMURENSE, Rupr.

PHELLODENDRON SACHALINENSE, Sarg.

Phellodendron Sachalinense, *n. sp.*

Phellodendron Amurense, var. Sachalinense, Fr. Schmidt, *Mém. Acad. Sci. St. Pétersbourg*, sér. 7, xii. 120 (*Fl. Sachalin.*). — Palibin, *Act. Hort. Petrop.* xvii. 51 (*Conspect. Fl. Koreæ*).

? Phellodendron Amurense, Franchet & Savatier, *Enum. Pl. Jap.* i. 73 (1875).

Leaves from 20 to 30 centimetres long, with slender petioles and rachises slightly puberulous on the upper surface until after the flowers open, becoming glabrous; leaflets 7 to 10, oval to ovate, abruptly acuminate at the apex, concave-cuneate or rounded at the gradually narrowed base, when they unfold often sparingly villose on the upper side of the midribs and slightly pubescent beneath toward the base, especially on the midribs, usually becoming glabrous or occasionally furnished with a persistent fringe of pale hairs at the very base of the midrib, and at maturity dark rather dull green on the upper and pale or glaucous on the lower surface, usually from 8 to 12 centimetres long and from 3 to 5 centimetres wide, turning rather dull yellow in the autumn before falling; their petiolules slightly villose at first, soon glabrous, that of the terminal leaflet from 1.5 to 3 centimetres long, those of the lateral leaflets from 3 to 4 millimetres in length. Inflorescence glabrous, the staminate with its peduncle from 6 to 14 centimetres long and from 4 to 5 centimetres broad, the pistillate with its stouter peduncle from 8 to 10 centimetres long and from 4 to 5 centimetres broad. Flowers from 4 to 5 millimetres in length. Fruit from 8 to 10 centimetres in diameter, in panicles with their stout peduncles from 8 to 14 centimetres long, and from 6 to 8 centimetres broad; seeds from 4 to 5 millimetres long, about 3 millimetres wide.

A tree with a tall straight trunk covered with firm dark brown only slightly fissured bark broken into thin persistent plate-like scales, and stout gradually spreading branches forming a broad symmetrical crown; branchlets light chestnut-brown and very lustrous during their first and dull dark brown to purplish in their second winter, becoming darker the following year; winter-buds covered with bright rufous hairs, their scales becoming at maturity from 10 to 14 millimetres long, from 5 to 6 millimetres wide, and dark green. Flowers opening in the Arnold Arboretum from the 7th to the 10th of June.

Southern Saghalin, *Fr. Schmidt*, September, 1860, and July, 1861 (type!, Herb. Bot. Gard. St. Pétersbourg). Corea: Kyong-kwi, Seoul, June, 1856; *Kalinowsky* ex Palibin. Japan: Hokkaido, near Hakodate, *Albrecht*, 1861–63 (Herb. Gray); near Sapporo, 1866 (Herb. Arnold Arboretum ex Herb. Agric. College Sapporo).

Phellodendron Sachalinense was raised in the Arnold Arboretum in 1877 from seeds sent from Japan by Professor William S. Clark, then President of the Agricultural College at Sapporo in Hokkaido. It has flowered and borne fruit for several years, and in cultivation has proved to be the most satisfactory of the three species, forming a tall stem and a broad crown of branches. Seedling plants often spring up spontaneously in the borders, showing the power of this tree to adapt itself to the climate of the eastern United States, where it may be expected to become a valuable shade and ornamental tree.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE XCIV. PHELLODENDRON SACHALINENSE.

1. An inflorescence of the staminate tree, natural size.
2. A staminate flower, enlarged.
3. Vertical section of a staminate flower, enlarged.
4. A calyx-lobe, enlarged.
5. A petal, interior view, enlarged.
6. A stamen, front and rear views, enlarged.
7. An inflorescence of the pistillate tree, natural size.
8. A pistillate flower, enlarged.
9. A pistillate flower with the calyx and petals removed, enlarged.
10. Vertical section of an ovary, enlarged.
11. A cluster of fruit and a leaf, natural size.
12. Vertical section of a fruit, enlarged.
13. Cross section of a fruit, enlarged.
14. Vertical section of a fruit with the flesh removed, showing the attachment of the nutlets to the columella, enlarged.
15. A nutlet with the endocarp partly open, enlarged.
16. A seed, ventral view, showing the hilum, enlarged.
17. A seed, lateral view, enlarged.
18. An embryo, enlarged.

C. E. Faxon del.

PHELLODENDRON SACHALINENSE, Sarg.

PHELLODENDRON JAPONICUM, MAXIM.

PHELLODENDRON JAPONICUM, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xvi. 212 (1871); *Mél. Biol.* viii. 1. — Franchet & Savatier, *Enum. Pl. Jap.* i. 73. — Diels, *Engler Bot. Jahrb.* xxviii. 424 (*Flora von Central-China*). — Dippel, *Handb. Laubholzk.* ii. 352, f. 163. — Koehne, *Deutsche Dendr.* 348.

PHELLODENDRON AMURENSE, Wildeman, *Icon. Hort. Then.* v. 45, t. 171 (not Ruprecht) (1904).

Leaves from 25 to 35 centimetres long, with stout petioles and rachises hoary-tomentose early in the season, becoming pubescent, with nine to eleven leaflets or occasionally equally pinnate; leaflets broadly ovate, gradually narrowed at the apex into long acuminate points and very unsymmetrical at the base, with one side full and rounded and the other cuneate or slightly rounded, when they unfold yellow-green, coated with hoary tomentum soon deciduous from the upper surface and ciliate on the margins, and at maturity dark dull green and slightly villose above along the midribs and veins, covered below with long white hairs most abundant on the midribs and veins, and naked on the margins, usually from 8 to 10 centimetres long and from 4 to 5 centimetres wide, turning dull yellow in the autumn before falling; their petiolules stout, tomentose, that of the terminal leaflet from 1.5 to 1.8 centimetres long, those of the lateral leaflets from 5 to 6 millimetres in length. Inflorescence hoary-tomentulose, the staminate with its peduncle from 7 to 9 centimetres long, and about as broad, the pistillate with its more slender peduncle from 7 to 8 centimetres in length, and from 4 to 5 centimetres broad; flowers about 6 centimetres in length. Fruit from 10 to 12 millimetres in diameter, in clusters with their peduncles 8 to 12 centimetres long, and often rather broader than long; seeds 5 to 6 millimetres long and 3 to 4 millimetres wide.

A bushy tree, in cultivation from 7 to 10 metres high, with a short trunk sometimes 30 centimetres in diameter, covered with dark brown bark divided by shallow fissures into broad flat ridges roughened by small thin closely appressed scales; branches stout ascending, dark brown and fissured near the base, smooth and paler toward the ends, forming a very irregular open head; branchlets reddish brown with an olive tone, and covered with a faint bloom during their first winter, becoming dull and darker colored the following year; winter-buds covered with dark rufous hairs. Flowers in the Arnold Arboretum about the 20th of June.[1]

Japan, Hondo: Mt. Fugi-san, *Maximowicz*, 1862 (type !, Herb. Bot. Gard. St. Pétersbourg, and in Herb. Gray); prov. Nambu, *Tschonoski* (Maximowicz, Iter Secundum, in Herb. Gray); Shiobara, near Nikko (Herb. Arnold Arboretum ex Herb. Sci. College Imperial University of Japan). China: Hupeh, *Henry*, 1885–86 (No. 4003, Herb. Gray); Kuichan, Nanch'uan, *Rosthorn* ex Diels.

[1] In October, 1892, I found near Agamatsu, on the Nagasendo in central Hondo, a single Phellodendron tree about 18 metres high, with a trunk 40 to 50 centimetres in diameter. The leaves are fifteen-foliolate, and the leaflets are very unsymmetrical at the long gradually narrowed base, and are villose on the midribs and veins below. In September of the same year I collected a specimen of Phellodendron between Nikko and Umoto, apparently of the same form, but with only seven leaflets. Plants raised in the Arnold Arboretum in 1879 from seeds sent from the Arboretum Segrezianum, in France, are apparently of this form, but the plants which flowered and fruited several years ago have unfortunately been destroyed. No. 2780 of the herbarium of the Kew Arboretum seems to belong here, and I have seen the same form in the garden of the Museum d'Histoire Naturelle in Paris. If this is not another species of Phellodendron, it is certainly a distinct form of *Phellodendron Japonicum*, to which it has usually been referred. Flowers of this form have not been seen.

Phellodendron Japonicum in its typical form is well distinguished by the hoary tomentum found on the lower surface of the broad leaflets, and on the petioles and panicles, and by the later appearance of the flowers. It was raised before 1870 in the Botanic Garden of Harvard University, at Cambridge, from seeds sent from the Imperial Botanic Garden at St. Petersburg and probably collected by Maximowicz in Japan, the trees raised from these seeds agreeing exactly in foliage and fruit with Maximowicz's type specimens. The species with both sexes is well established in several gardens in the neighborhood of Boston, where it flowers and fruits freely every year. The young plants are rather tender and difficult to establish, but become hardy at the end of a few years. Its small size and bushy habit make it the least desirable of the three species as an ornamental plant.

C. S. S.

EXPLANATION OF THE PLATE.

Plate XCV. Phellodendron Japonicum.

1. An inflorescence of a staminate tree, natural size.
2. The bud of a terminal staminate flower showing its bractlet, enlarged.
3. A staminate flower, enlarged.
4. Vertical section of a staminate flower, enlarged.
5. A calyx-lobe, enlarged.
6. A petal, interior view, enlarged.
7. A stamen, front and rear views, enlarged.
8. An inflorescence of a pistillate plant, natural size.
9. A pistillate flower, enlarged.
10. A pistillate flower showing the development of the staminodia, enlarged.
11. A pistillate flower with the calyx and petals removed.
12. Cross section of an ovary, enlarged.
13. A cluster of fruit and a leaf, natural size.
14. Vertical section of a fruit, natural size.
15. Cross section of a fruit, natural size.
16. A nutlet with the endocarp partly open, enlarged.
17. A seed, lateral view, enlarged.
18. A seedling plant, natural size.

C. E. Faxon del.

PHELLODENDRON JAPONICUM, Maxim.

ARCTOSTAPHYLOS VIRGATA, EASTW.

ARCTOSTAPHYLOS VIRGATA, *n. sp.*

Leaves oblong to elliptical, acuminate or acute and cuspidate at the apex, cuneate to obtuse at the base, entire to crisped and spinulose-serrulate, glandular-ciliate, bright green, scabrous, from 3 to 6 centimetres long, from 1 to 2 centimetres or more wide, erect-spreading or becoming deflexed in age, crowded near the inflorescence, more remote below; their petioles stout, from 2 to 5 millimetres in length. Flowers on slender glandular-hairy spreading pedicels, 1 centimetre long, becoming reflexed at maturity and readily disarticulating at the base, clustered in simple or sparingly branched racemes terminal on erect branchlets, with very short recurved peduncles and prominent bracts, the lowest oblanceolate, tapering to the ends, from 2 to 3 centimetres long, green and foliaceous, the upper rose-color, half as long as the pedicels, very glandular and conspicuously glandular-ciliate; calyx-lobes oblong-ovate or orbicular, pale pink, with darker veins, obtuse, glandular, and 2 centimetres in length, becoming revolute; corolla urceolate, white or white tinged with red, from 8 to 10 millimetres long, the lobes short, rounded, reflexed, slightly hairy on the inner surface near the erose or entire margin, glabrous externally; filaments broad and ciliate at the base, tapering to a long slender point; anthers dark wine color, 1 millimetre long, the tails twice as long; receptacle the color of the anthers; ovary clothed, especially around the summit, with hairs tipped with reddish glands; style thick, terminating in a green capitate stigma. Fruit depressed-globose, very glandular, with thin granular pulp; nutlets variously separable and shaped, the grains of the pulp adhering to their rough surface.

A shrub, from 1 to 3 metres high, with slender erect stems covered below with smooth reddish bark; branchlets green, glandular-hairy, extending after the opening of the flowers beyond the racemes of fruit. Flowers in December. Fruit ripens in July.

Mt. Tamalpais and the hills west of Tomales Bay, California; most abundant and characteristic at the lower part of the Boot-jack Trail on Mt. Tamalpais, not far from Redwood Cañon; *A. Eastwood*, Boot-jack Trail, February, 1897, December, 1902, and July, 1903 (Herb. Arnold Arboretum).[1]

Arctostaphylos virgata, which is one of the earliest species in flower, blooming generally with *Arctostaphylos canescens*, Eastwood, is readily distinguished from allied species by its virgate stems, bright green thinner leaves similar in texture to those of *Arctostaphylos Andersoni*, Gray, but differing from them in shape. The flowers, which contain a delicious honey, are delightfully fragrant. Its nearest relative on Mt. Tamalpais is *Arctostaphylos glandulosa*, Eastwood, which it resembles in the flattened-globular, glandular fruit, the glandular-hairy leaves, and in the honey-scented flowers. The two species occur together, but are readily distinguished by their habit of growth, by the different color and texture of the foliage, and by the earlier flowering of *Arctostaphylos virgata*. The specific differences of these species have been continually impressed on me by frequent observation extending over a period of several years.

ALICE EASTWOOD.

California Academy of Sciences.

[1] Distributed by C. F. Baker, Plants of the Pacific Coast, No. 3158.

EXPLANATION OF THE PLATE.

Plate XCVI. Arctostaphylos virgata.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A flower with the corolla laid open, enlarged.
4. A stamen, enlarged.
5. A fruiting branch, natural size.
6. Nutlets, enlarged.
7. Nutlets, two removed, enlarged.

C. E. Faxon del.

ARCTOSTAPHYLOS VIRGATA, Eastw.

ARCTOSTAPHYLOS VESTITA, EASTW.

ARCTOSTAPHYLOS VESTITA, *n. sp.*

Leaves oblong, ovate or elliptical, truncate, cordate or obtuse at the base, apiculate at the acute apex, entire or the young ones sometimes spinulose-serrulate, scabrous, bright green and minutely pubescent on the upper surface, finely reticulate and more or less hoary-tomentose on the lower surface, becoming smoother and greener with age, from 2 to 5 centimetres long and from 1 to 2.5 centimetres wide; their petioles broad, from 1 to 3 millimetres long and sometimes nearly as wide. Flowers on tomentose pedicels becoming almost horizontal at maturity, densely clustered in short racemes or close terminal panicles on very short peduncles recurving in bud and flower, becoming generally more spreading at maturity, their bracts foliaceous, linear, acute, keeled, persistent, the lower 1 centimetre long and 4 millimetres wide, the upper less than half as large, equalling or surpassing the pedicels; sepals orbicular, thin, ciliate, reflexed, pubescent on the inner, glabrous on the outer surface, almost 2 centimetres wide; corolla broadly urceolate, 5 millimetres wide, with very short and broad spreading lobes, densely white-bearded on the inner surface especially around the throat; stamens with filaments broadly dilated and clothed below with white hairs; anthers dark wine-color, orbicular, the hispid horns curved, slightly longer than the cells; ovary globular, flattened, densely clothed with white hairs. Fruit globose-flattened to globose, pubescent; nutlets variably separable, not uniform in shape, surrounded by a rather thick covering of granular pulp.

A shrub, a metre or more high, divaricately branching, the older stems covered with brown shreddy persistent bark; branchlets tomentose, ribbed or angled. Flowers early in March. Fruit ripens in May.

Monterey, California, growing abundantly on the sandy plain between the Hotel del Monte and the shore, *T. S. Brandegee*, June, 1889, *A. Eastwood*, March, 1900 and 1903 (Herb. Arnold Arboretum).[1]

Arctostaphylos vestita appears to be exceedingly variable, but is distinguished in its most typical form by the contrast between the upper and lower surface of the young leaves and the ragged-looking shreddy stems, so different from the smooth stems of the other species belonging to the group with long bracts. The roots do not form masses of wood like some of the other members of this group. There is what is perhaps a form of this species growing at Monterey, differing chiefly in the pubescence and in the shape of the fruit, distinguished by the young stems clothed with loose woolly hairs as well as with tomentum, and by the more or less spinulose-serrulate leaves green on both surfaces. The bark of this form is of the same character as that of *Arctostaphylos vestita*, Eastwood.

ALICE EASTWOOD.

California Academy of Sciences.

[1] *Arctostaphylos vestita* has been distributed by A. A. Hiller, Nos. 6453, 6475, and 6495.

EXPLANATION OF THE PLATE.

Plate XCVII. Arctostaphylos vestita.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A flower, the corolla laid open, enlarged.
4. A stamen, enlarged.
5. A fruiting branch, natural size.
6. Nutlets, enlarged.
7. Nutlets, the flesh removed, enlarged.

C. E. Faxon del.

ARCTOSTAPHYLOS VESTITA, Eastw.

DRACÆNA AMERICANA, Donn. Sm.

Dracæna Americana, *n. sp.*

Leaves linear-ensiform, tapering from about the middle to an acute apex, contracted above the dilated and obliquely amplexicaul base, from 21 to 35 centimetres long, from 1 to 2.3 centimetres broad, pergameneous, with scariose margins, green on both surfaces, ecostate, at first erect, becoming recurved; nerves prominent above and beneath, at the base of leaf from 16 to 19, and at its middle from 40 to 50, including the intermediate weaker ones. Panicles ovoid, dense, from 13 to 24 centimetres high, scarcely equalling the nearest leaves; branches alternate, leafy-bracted, short, spreading at an angle of from 45° to 60°; racemes from 4 to 8 centimetres long; pedicels solitary, binate or ternate, from 3 to 6 millimetres long, articulated above their middle; bractlets cuspidate-deltoid, minute; perianth white, 7 millimetres long, the segments 6 times longer than the tube; stamens 5 millimetres long; filaments yellow, broadly applanate, contracted at each end; anthers a third shorter, pallid, affixed near their base; ovary oval, with the twice longer style equalling the perianth in length, ovules solitary, orbicular. Berry greenish yellow, pulpose, 3 or by abortion 2–1-seeded; if 3-seeded, depressed-globose, slightly and obtusely 3-lobulate, transversely about 2 centimetres in diameter; if 2-seeded, transversely oval; if 1-seeded, globose; seeds subglobose, from 10 to 12 millimetres in diameter.

A tree, from 7 to 12 metres high, with a trunk from 2 to 3 decimetres in diameter, clad with a grayish and somewhat exfoliating bark; branches dichotomous; young branchlets striate, marked by the oblique and completely annular scars of fallen leaves, densely leafy for the space of from 3 to 4.5 decimetres below their tips. Fruit maturing in December.

Guatemala: Department of Alta Verapaz, forests of Hacienda Cubilquitz, at an altitude of 350 metres above the sea-level, *H. von Türckheim*, March, 1902 (No. 8312 of my Series of Central American plants). Honduras, Department of Santa Bárbara, San Pedro Sula, at an altitude of 300 metres above the sea-level, *C. Thieme*, May, 1888 (No. 5602 of the same Series); Rio Tela, Puerto Sierra, *Percy Wilson*, February, 1903 (No. 425). Costa Rica, Comarca de Puntarenas, Puente Lagurto, at an altitude of 500 metres above the sea-level, *Adolfo Tonduz* (No. 4811); Comarca de Puntarenas, Santa Fe, *Enrique Pittier*, February, 1897 (No. 11200).

According to the arrangement in Baker's Monograph of the Asparagaceæ (*Jour. Linn. Soc.* xiv. 508), this species belongs to the Section of which *Dracæna Draco, L.*, is the type. It is, in fact, nearest to that species by its minute flowers. Since the genus has been known hitherto only from the Old World, its representation in America is an interesting discovery. The widely separated localities, as above cited, indicate the general distribution of this species throughout Central America in the *tierra caliente* of both the Atlantic and the Pacific slopes. Young plants produced from seeds, brought by Mr. Wilson from Honduras, are under cultivation in the New York Botanical Garden. Duplicates of Nos. 8312 and 5602, under the name of *Cordyline oligosperma, Donn. Sm. ined.*, have been communicated to the following herbaria: Arnold Arboretum and Gray Herbarium, Harvard University; Smithsonian Institution; Columbia University; Missouri Bot. Garden; Royal Gardens, Kew; Königl. Bot. Museum, Berlin; Bot. Museum der Universität, Munich.

John Donnell Smith.

Baltimore.

EXPLANATION OF THE PLATE.

PLATE XCVIII. DRACÆNA AMERICANA.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A stamen, front and rear views, enlarged.
4. A pistil, enlarged.
5. A pistil transversely divided through the ovary, enlarged.
6. A berry, natural size.
7. A seed, enlarged.
8. Vertical section of a seed, enlarged.
9. Base of a leaf, showing the nervation, natural size.
10. Middle part of a leaf, showing the nervation, natural size.
11. A branchlet, showing scars of fallen leaves, natural size.

C. E. Faxon del.

DRACÆNA AMERICANA, Donn. Sm.

PINUS ALTAMIRANI, Shaw.

Pinus Altamirani, *n. sp.*

Leaves in clusters of three or of four, occasionally of five, closely serrate, straight, standing at wide angles with the branch, and from 18 to 30 centimetres long, becoming distinctly patulous in their second year; hypoderm in single or partly double rows between the stomata, detached from the epidermis by thin-walled cells; stereome tissue found above and below the two fibro-vascular bundles forming the conspicuous borders of the resin ducts, normally in close contact with the endoderm but frequently slightly detached from it and occasionally distinctly medial in the green tissue, the outline of the stele corresponding approximately with that of the leaf; sheaths persistent, in the first season rich lustrous brown and about 3 centimetres long, becoming in their second year ragged, dull black, and less than half their original length. Staminate flowers about $1\frac{1}{4}$ inches long, in compact clusters; pistillate flowers purple and terminal. One-year-old cones subterminal, long-stalked, erect, with glossy dark brown scales armed with small terminal prickles sometimes persistent toward the apex of the cone; mature cone oblique, reflexed, soon deciduous from the branch, from 6 to 9 centimetres long, at first of an ochre color, weathering to a darker brown; outer scales tumid, those near the base often very protuberant and somewhat reflexed; umbos salient and rounded, their apophyses at maturity usually cracked radially, the epidermis of the umbo partly falling away.

A tree, from 25 to 30 metres high, with a trunk from 50 to 70 centimetres in diameter at the base, covered with dark gray scaly bark, small comparatively straight branches, and conspicuous gray-green foliage; branchlets curved upward, brittle, covered with a glaucous bloom disappearing in the second season with the outer layer of bark, and in the second season covered with pale red to dark brown scales, becoming dark gray like the trunk at the end of a few years.

Uruapan, Mexico, at an altitude of 1700 metres above the sea-level, *C. G. Pringle* (No. 10017), *F. Altamirano*, and *George R. Shaw*, October, 1904. E. W. Nelson's Nos. 2537–2538, Miahuitlan, Oaxaca, 1895, may belong here.

Pinus Altamirani was found near the town of Uruapan in the state of Michoaçan directly west of the City of Mexico, and also on the road to the neighboring Falls of Tzararacua, where it is the only Pine. At the higher level of Uruapan it associates with *Pinus oocarpa*, Schiede, and two species of the Montezumæ group, and on the neighboring hills reaches the lower border of the zone where *Pinus Pringlei*, Shaw, grows. It is easily recognized among the other Pines of the region by the conspicuous gray tone of its foliage, although at a distance it might be confounded with a few sporadic individuals of *Pinus leiophylla*, Schlechtendal & Chamisso, which grows in abundance at a higher altitude on the road to Patzcuaro where *Pinus Altamirani* is not found. The bark of the oldest trees is thin and flaky except at the very base of the trunk where it accumulates in ridges of loosely laminated easily detachable scales. Like some other Mexican Pines with normally subterminal cones it occasionally produces double nodes and lateral cones on the branchlets of the year, and pseudo-lateral young cones occasioned by a short incomplete midsummer growth. The description and figure of the flowers are from precocious autumn flowers, and flowers produced at the normal season may be larger and more conspicuous.

With his permission this species is dedicated to Signor el Doctor Fernando Altamirano, the genial and courteous Director of the Instituto Médico Nacional in the City of Mexico.

George Russell Shaw.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate XCIX. Pinus Altamirani.

1. A branch with staminate flowers, natural size.
2. A staminate flower, enlarged.
3. An anther, front view, enlarged.
4. An anther, side view, enlarged.
5. End of a branch with a pistillate flower, natural size.
6. A branch with cones, natural size.
7. A seed, front and rear views, natural size.
8. Leaf clusters with their sheaths, natural size.
9. Cross section of a leaf, much magnified.

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C. E. Faxon del.

PINUS ALTAMIRANI, Shaw

PINUS PRINGLEI, SHAW.

PINUS PRINGLEI, *n. sp.*

Leaves in clusters of three, rigid, about 25 centimetres long; hypoderm detached from the epidermis by thin-walled cells, massive and very conspicuous, forming triangular bundles projecting far into the green tissue often to the endoderm and occasionally impinging on a resin duct; resin ducts bordered by strengthening cells, internal, lying close against the stele, the two fibro-vascular bundles associated with a lower and upper row of stereome tissue, the stele large and in outline following very closely that of the leaf; sheaths $2\frac{1}{2}$ centimetres long, persistent, becoming somewhat shorter the second year and very dark, almost black. Buds of the staminate flowers very conspicuous, in spicate clusters up to 8 centimetres in length; mature flowers not seen. One-year-old cones subterminal, reflexed on long stalks, beginning to grow in October; mature cone oblique, ochre yellow, reflexed, stalked, often in twos and threes, very persistent, from 7 to 10 centimetres in length, and serotinous, its scales semilustrous, the apophyses delicately keeled in radial lines, the scales near the base often elongated longitudinally and frequently developing a pronounced reflexed protuberance; umbos dark, those near the apex of the cone often armed with small spines.

A tree, from 15 to 20 metres high, with a trunk from 40 to 60 centimetres in its largest diameter, covered with dark gray bark; branches slender, very sinuous, curving upward at the ends, bearing broad tufts of bright green foliage and often large numbers of old cones; branchlets without bloom, the bark at first very deciduous and for a few years pale red from the constantly fresh exposure of the inner bark, soon assuming the dark gray color of the trunk as the bark acquires a more permanent character.

Uruapan, Mexico, *C. G. Pringle* (No. 10019), *F. Altamirano*, and *George R. Shaw*, October, 1904.

Pinus Pringlei was found near Uruapan in the state of Michoacan, where it covers the tops of the hills nearest the town to the exclusion of all other species, and at intermediate levels is associated with *Pinus Altamirani*, Shaw, *Pinus oocarpa*, Schiede, and two species of the Montezumæ group, but was not found at the lower levels where these four species grow abundantly. The tree was very conspicuous in October from its new growth, all the trees of this species growing as if it were spring, the young cones enlarging and the buds of the staminate flowers far advanced and apparently ready to open. This unusual precocity of growth cannot be wholly ascribed to the peculiar climatic conditions of this particular season, as *Pinus Pringlei* was the only one of the five or six species of Pinus at Uruapan which had begun a new growth. There is no reason to assume that in the subtropical climate of this region a growth so far advanced would come to an abrupt stop; and the conclusion naturally to be drawn from the condition of the trees is that *Pinus Pringlei* flowers in October or November. Some of the cones of this species in shape, color, and persistence suggest those of *Pinus patula*, Schiede and Deppe. The similarity between these two trees ends, however, with the cones. The delicate pendulous foliage, the lateral cones, and the red upper trunk of *Pinus patula* could never be confounded with those of this species. The absence of bloom on the branchlets, if it proves to be constant for all localities, is of diagnostic importance, as there are very few Mexican Pines without a more or less conspicuous bloom on the branchlets.

This species is dedicated to Cyrus G. Pringle of the University of Vermont, whose long and indefatigable labors in the collection of Mexican plants are known to all botanists.

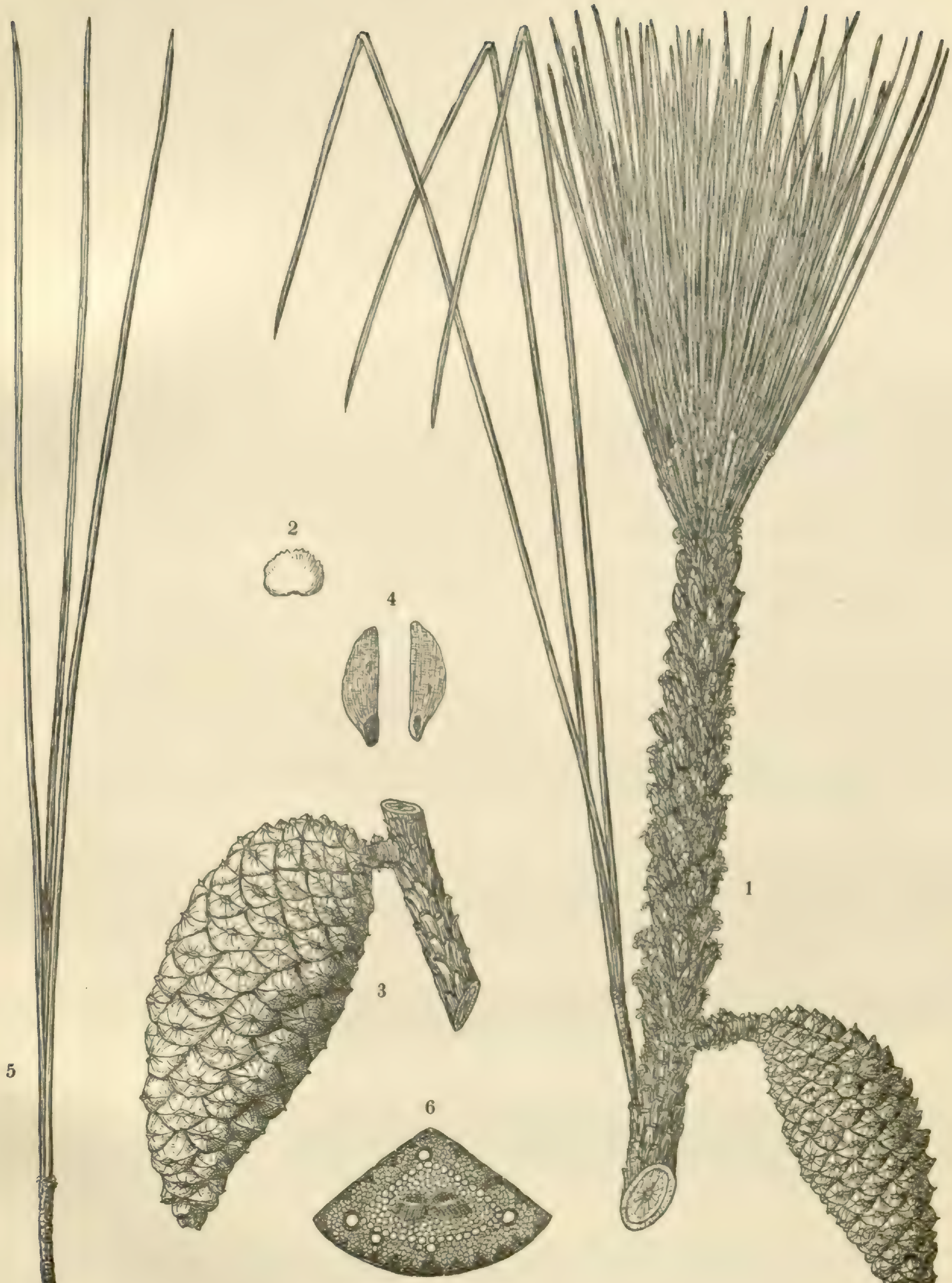
GEORGE RUSSELL SHAW.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate C. Pinus Pringlei.

1. A growing branch with a one-year-old cone, natural size.
2. An anther, front view, enlarged.
3. A mature cone, natural size.
4. A seed, front and rear views, natural size.
5. A cluster of leaves with its sheath, natural size.
6. Cross section of a leaf, much magnified.



C. E. Faxon del.

PINUS PRINGLEI, Shaw

CORRECTIONS.

FAXONANTHUS (p. 23). This genus belongs to the Scrophulariaceæ and should be placed near Leucophyllum (see Greenman, *Bot. Gazette*, xxxv. 214).

VIBURNUM VENOSUM (p. 85). The reference to the affinity of this species with *Viburnum molle*, Michaux, will have to be modified. The plant believed to be *Viburnum molle* when the description was written, and cultivated in the Arboretum under that name, has now been named *Viburnum venosum*, var. *Canbyi*, Rehder, the *Viburnum molle* of Michaux having been found to be the same as *Viburnum Demetrionis*, Deane & Robinson, known at present only from Kentucky and Missouri, while the *Viburnum molle* of most American authors is the *Viburnum semitomentosum* of Rehder (see Rehder, *Rhodora*, vi. 60 [1904]). A. Rehder.

TILIA MONGOLICA (p. 121). The synonyms quoted in the footnote under *Tilia Sibirica* belong apparently to two different species, first to *Tilia Sibirica*, Bayer, with the synonym *Tilia cordata*, var. *Sibirica*, Maximowicz, and second to *Tilia Amurensis*, Borbás, to which all the other synonyms quoted should be referred. The name *Tilia Mandschurica*, Maximowicz, cannot be retained for the species as an older *Tilia Mandschurica*, Ruprecht & Maximowicz, exists. A. Rehder.

EVONYMUS SIEBOLDIANUS (p. 123). The plant here described and figured is considered by Koehne as a distinct species and has been named by him *Evonymus hians* (*Gartenflora*, liii. 33 [1904]), but according to my observations the length of the filaments cannot be used as a specific character, as this depends on sexual differences, and the splitting of the arillus appears to be an irregular and more or less abnormal feature. I have seen specimens from the same plant collected in different years which behave differently in this respect. Koehne ascribes to the true *Evonymus Sieboldianus* globose, not lobed, but 4-ribbed fruits, while Blume (*Bijdr. Fl. Ned. Ind.* 1147 [1826]) says in his description "capsulis acute tetragonis," which agrees with the Japanese specimens that I have seen, and with the plant described and figured in this work. A. Rehder.

VIBURNUM BRACTEATUM (p. 135). To the synonym of this species should be added *Viburnum molle*, Chapman (*Fl.* ed. 3, 190 [not Michaux] [1897]). (See Rehder, *Rhodora*, vi. 59.) A. Rehder.

LIGUSTRUM CILIATUM (p. 141). The species described and figured here under this name has been recently separated by Koehne from the typical *Ligustrum ciliatum* under the name of *Ligustrum acuminatum* (*Festschrift Siebz. Geburtst. Ascherson*, 201, f. 3, A. [1904]). The chief differences by which *Ligustrum acuminatum* differs from *Ligustrum ciliatum* are the generally longer leaves (30–80 millimetres long and 13–30 millimetres broad), the small paniculate inflorescence (in *Ligustrum ciliatum* mostly reduced to few-flowered head-like racemes), and the anthers equalling the lobes of the corolla, while in *Ligustrum ciliatum* they are only half as long as the lobes. It was admitted that the plant cultivated at the Arnold Arboretum did not agree perfectly with the typical *Ligustrum ciliatum* of Blume, but having only scanty material at my disposal and no opportunity to observe the true *Ligustrum ciliatum* in the living state, I was unable to find sufficient differences to separate specifically the two forms. Koehne in the same paper also considers *Ligustrum Tschonoskii* as a distinct species, and describes another closely related new species as *Ligustrum macrocarpum*, based on a cultivated plant distributed by the French nursery firm Levavasseur as *Ligustrum medium*. A. Rehder.

PINUS TERTHROCARPA (p. 149). After the publication of this species my attention was drawn to a paper by Monsieur A. Morelet (*Bull. Soc. Hist. Nat. Moselle*, vii. p. 97 [1885]), in which two new Pines discovered by the author in western Cuba and on the Isle of Pines are described. Of these *Pinus tropicalis* is my *Pinus terthrocarpa*, and *Pinus tropicalis*, Morelet, must therefore replace *Pinus terthrocarpa*, Shaw, as the name of this species (see *Gard. Chron.* ser. 3, xxxvi. 98). George R. Shaw.

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